CONVENTION ISSUE

INFORMATION LETTER

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Proceedings of the 49th Annual Convention

The 49th Annual Convention of the National Canners Association in Atlantic City devoted its two general sessions to specific themes this year, and its technical sessions were increased in number and variety.

The Golden Anniversary of the Federal Food and Drug Law was celebrated at the Opening General Session on Friday morning, January 20. The Farm Problem, both in its national aspects and specifically with reference to fruits and vegetables for canning, was the theme of the Closing General Session on Saturday afternoon, January 21. Capacity attendances in the American Room of The Traymore characterized both sessions.

Several of the projects now underway in the Consumer and Trade Relations Program were woven into the Convention Program. The first annual Food Editors Conference, which brought to Atlantic City about 60 of the women who write, edit and broadcast information about foods through national media, was one of these.

Another was the N.C.A. Farm Youth program. William Rockefeller, 16, of Phelps, N. Y., the 1955 winner, was guest of the Association at the Convention and figured in several events—a broadcast interview with the McCanns of Station WOR; a talk before the Food Editors Conference; and an appearance at the speakers platform with Secretary of Agriculture Benson who gave him a special plaque on behalf of N.C.A. The remarks by the Secretary and young Rockefeller's reply made up a special broadcast, staged live from the meeting, that went out over NBC's Monitor network, and the two were televised later by Telenews Service. The Farm Youth Program was discussed on the special Farm Problem program Saturday afternoon by P. K. Shoemaker, Chairman of the N.C.A. Raw Products Committee, who introduced Rockefeller to the Secretary.

And lastly, aspects of the Trade Relations phase were presented in different sessions—the Marketing Session on Friday afternoon, with a special panel of independent retailers, moderated by the well-known Marie Kiefer, Secretary-Manager of the National Association of Retail Grocers; and the membership of the National Food Brokers Association, holding their annual meeting on Monday, January 16, heard an address by E. A. Meyer, Chairman of the N.C.A. Consumer

1956 OFFICERS OF THE N.C.A.
(left to right)

Executive Secretary-Treasurer Carlos Campbell, President William U. Hudson, and Vice President A. Edward Brown.

Service Committee, on how the broker can participate in the Association's C & TR Program.

Food Law Observance

The canning industry's historic association with and support of food and drug legislation was expressed not only program-wise at the Opening General Session, but was the subject of one of the official resolutions, unanimously passed, as the Convention closed.

It was brought out in the Friday speeches that the famous Dr. Harvey Washington Wiley, crusader for the "Pure Food Law" in Theodore Roosevelt's day, was the first guest speaker to appear before the newly-formed N.C.A. in 1907, a few months after passage of the Law, and that the first official resolution on the Association's minute books urged passage of appropriation bills to implement the new law. Canning industry support is acknowledged by Wiley in his autobiography.

President George B. Morrill, Jr., introduced the proceedings with the statement, "The National Canners Association today does honor to the Food and Drug Law of 1906, to the Food and Drug Administration and its Commissioners, who have ably and conscientiously carried out their responsibilities in enforcing the Law, and to the friendly and cooperative relationship between the Food and Drug Administration and the N.C.A. down through the years.

"The N.C.A. stands ready to cooperate with the Food and Drug Administration in strengthening the Law wherever strengthening is needed, to further protect and improve the health and welfare of the people of the United States of America."

"We have behind us a 50-year record of achievement that should enable us to approach future problems with full assurance that they can be worked out to the benefit of the industry, the public, and the nation as a whole," stated H. N. Riley, of the H. J. Heinz Company, who appeared on the program as a member of the Citizens Advisory Committee on the Food and Drug Administration. "Those of us who are on the wrong side of of 60 will remember that in 1900 delegating to government the power of regulation and control over business was little practiced in this country."

Fortunately there were far-sighted men in the industry, he stated. "I imagine they feared government control and regulation as much as any man, and I am sure they knew there were many phases of American enterprise where the federal government should never be permitted to intervene. But they knew that where health and safety of the public are concerned, the government, even in a free capitalist democracy, does have the right and duty to intervene in the public interest.

A. EDWARD BROWN
1956 Vice President

"What is more, these far-sighted men knew there was little hope for a sound and profitable future for their industry unless it was based on the public trust. They felt that here was a means by which the food industry could gain the confidence of the individual citizen—confidence that was wholly essential if the processing of food was to develop into one of the nation's major industries.

"The great majority of the food industry has met good will with good will. We have sincerely tried to make enforcement of the law not too impossible a task, and we have endeavored to cooperate constructively in strengthening and perfecting it. Together, we have given the nation proof that the government can regulate an industry without controlling it."

Dr. Karl F. Meyer, Director Emeritus of the George Williams Hooper Foundation for Medical Research of the University of California, presented a historical review of the situation that led to agitation for the Pure Food Law, the philosophy and practicality of the law, the history of its passage, including canning industry support, the many phases of its evolution and scientific and industrial development, and stressed its importance in the total well-being of the world today.

"The far-sighted executive committee of the National Canners Association decided that the problem could be solved only through research by competent chemists and bacteriologists." Thus scientific laboratories were established, he explained. "Research from the three Association laboratories has been and is scientifically sound and thorough, reliable as to fact and interpretation, worthy of respect and trust. Few organizations earn such high praise. Along with official agencies it has pursued their common goal—prevention of disease and promotion of welfare through nutrition.

"It is these far-reaching considerations that have guided those responsible within the government and the food industries in activating the Food and Drug Law established in 1906. By bringing together the men of the canning and allied industries to commemorate passage of the law, they pay honor to the staunch crusaders, the scientists, the administrators and the inspectors who had the vision, the knowledge of technology, the wisdom, the intelligence and the integrity to make it an instrument of social progress."

Governor Robert B. Meyner had proclaimed the week of January 20 to 26 as "The New Jersey Food and Drug Week", choosing those particular dates to make the period simultaneous with the N.C.A. Convention dates. The Governor was to have addressed the Convention but a conflict prevented, and the State was represented by the Attorney General, the Honorable Grover C. Richman, Jr., who was felicitously introduced to the audience by James McGowan, Jr., chairman of the board of Campbell Soup Company.

Mr. Richman stated that for almost 10 years as Assistant and later U. S. Attorney it had been part of his responsibility to enforce the Food and Drug laws in the District of New Jersey. "I realized," he said, "that the success of that law depended not only on our activity but upon the cooperation—the wholehearted cooperation of industry, and it was always my observation during that time that your industry was perhaps the most cooperative; that you did everything you could do to assist in the efficient administration of those laws and to obtain the objectives for which they were passed."

Mr. Richman reviewed the importance of New Jersey in general industry and specifically in canning, and read the Governor's Official Proclamation.

Acknowledgment of the many tributes paid by speakers to the Food and Drug Administration, and of the constant support and cooperation of the canning industry was made by The Honorable George P. Larrick, the U. S. Food and Drug Commissioner whose concluding remarks were:

"We have cited a few instances to show how closely your industry and the FDA have worked together during half a century to assure the American housewife that she can buy canned food with confidence and feel sure of receiving a product of recognized quality, in a properly filled container, with

(Please turn to page 119)

William U. Hudson Elected 1956 President of N.C.A.; A. Edward Brown Chosen Vice President

William U. Hudson, first vice-president in charge of production and research, Gerber Products Co., Oakland, Calif., was elected 1956 President of the N.C.A.

He succeeds George B. Morrill, Jr., of Burnham & Morrill Co., Portland, Maine.

A. Edward Brown, vice president and treasurer of Michigan Fruit Canners, Inc., Benton Harbor, Mich., was elected 1956 Vice President.

Carlos Campbell of Washington, D. C., was continued in office as Executive Secretary-Treasurer.

The N.C.A. membership elected 23 Directors to new terms and 2 Directors to fill unexpired terms; the terms of 45 members of the Board of Directors were held over.

President Hudson, Vice President Brown and the newly-elected Directors were the unanimous choice of the Nominating Committee, of which Louis Ratzesberger, Jr. was chairman.

William U. Hudson

William U. Hudson, Oakland, Calif., is first vice president in charge of production and research, Gerber Products Co. Mr. Hudson has had a long career in food canning and in the last 15 years has been active in many phases of N.C.A. work.

He was born in Montpelier, Vt., October 13, 1896, and studied mechanical engineering at the University of California from which he was graduated in 1920. His school career was interrupted by service during World War I as an artillery lieutenant (1917-1918).

CARLOS CAMPBELL
Executive Secretary-Treasurer

Mr. Hudson entered the canning business in 1922 as superintendent of Winters Canning Co., Suisun, Calif. He then served from 1929 to 1933 as general superintendent of Hunt Bros. Packing Co., San Francisco. In 1934, with associates, he organized The Elmhurst Packers, Inc., in Oakland and served as vice president and production manager. He assumed his present duties with Gerber Products in November, 1943, at the merger of Elmhurst and Gerber. He is, in addition, a Gerber director; director of the Gerber-Ogilvie Company of Niagara Falls, Canada; director of Gerber Plastics Co. of St. Louis; and a trustee of The Gerber Baby Food Fund.

Mr. Hudson is active in many business and civic organizations. He is a director of the California Manufacturers Association, the Oakland Chamber of Commerce, California Processors and Growers, the Oakland Area Council of the Boy Scouts of America, and a member of the California State Water Pollution Control Board. He is a member of Oakland Rotary Club and a 32nd degree Mason.

Mr. Hudson has served on the Administrative Council of the N.C.A., and on the Raw Products Committee, Western Laboratory Committee, and the Western Technical Committee on Baby Foods (Chairman) since 1952. Prior to that time, he had given service on the Western Branch Laboratory Advisory Committee, and the Western Laboratory Building Committee. He was vice-president of N.C.A. in 1955.

A. Edward Brown

A. Edward Brown has been active in the canning industry for 20 years, since 1936, when he became a member of the board of directors of Michigan Fruit Canners, Inc., Benton Harbor, Michigan.

Born in South Haven, Mich., in 1907, he was educated in the public schools of St. Joseph, Mich., at Northwestern Military Academy, and at the University of Michigan, where he received his A.B. degree in 1929 and his L.L.B. in 1931. Mr. Brown practiced law in St. Joseph from 1931 through 1946, and was president of the Berrien County Bar Association in 1946.

His father and uncle, in 1896, had founded the South Haven Preserving Company, which some years later became a part of Michigan Fruit Canners, Inc. As a youth, Mr. Brown

WILLIAM U. HUDSON
1956 President

spent every summer from 1922 to 1930 at work in the canning plant, at various jobs on the production line and about the plant.

He was elected to the board of directors of Michigan Fruit Canners, Inc. in 1936, and served on that basis continuously through 1946. On January 1, 1947, he became vice president and treasurer of the firm, and his time since then has been devoted wholly to the affairs of the company. During his canning career Mr. Brown has carried responsibility for financial and general management of the firm.

Mr. Brown also has been active in the affairs of both his state and national associations. He was vice president of the Michigan Canners and Freezers Association in 1950 and 1951 and also served two terms as president, 1952 and 1953.

Mr. Brown has served the N.C.A. as a member of its Consumer Service Committee, Legislative Committee, Statistics Committee, and, during the Korean crisis, was chairman of a special War Mobilization Subcommittee concerned with price controls. He also served a term on the N.C.A. Board of Directors, 1949-53.

1957 Convention

The 1957 Convention will be held in Chicago, approximately the third week of February, with specific dates, details and arrangements to be announced at a later date.

N.C.A. Board of Directors

At the annual meeting, the N.C.A. membership elected 23 to three-year terms on the Board of Directors and 2 to fill unexpired terms. Together with 45 holdover members, following is the Board as now constituted:

NEW DIRECTORS

Roger E. Brickman, Illinois Meat Company, Chicago, Ill.

C. C. Cadagan, Maui Pineapple Co. Ltd., Maui, Hawaii

William Campbell, Fayette Canning Co., Washington Court House, Ohio

C. H. Carlson, Burnette Farms Packing Co., Hartford, Mich.

Shell R. Clevenger, Bush Bros. & Co., Dandridge, Tenn.

A. E. Coddington, Jr., Coddington Packing Co., Mt. Comfort, Ind.

Guy Graham, Libby, McNeill & Libby, Seattle, Wash.

H. W. Hartle, Owatonna Canning Co., Owatonna, Minn.

William J. Keifer, John W. Taylor Packing Co., Hallwood, Va.

Horace Larkin, Rochelle Asparagus Co., Rochelle, Ill.

Dougald MacDonald, Burnham & Morrill Co. Inc., Portland, Me.

Norman W. Merrill, Blue Lake Packers, Inc., Salem, Ore.

Francis J. Miller, Curtice Bros. Co., Rochester, N. Y.

Albanus Phillips, Jr., Phillips Packing Co. Inc., Cambridge, Md.

C. M. Pike, The Trident Packing Co., Inc., Lubec, Me.

Thomas Richards, Jr., Bercut-Richards Packing Co. Inc., Sacramento, Calif.

Alfred Rieck, Tripoli Canning Co., Tripoli, Iowa

Carl Roberts, S & W Fine Foods, Inc., San Francisco, Calif.

E. W. Sterr, Loyal Canning Co., Loyal, Wis.

T. E. Stinson, Alamo Products Co., Alamo, Texas

William Varney, Varney Canning, Inc., Roy, Utah

Alan Warehime, Hanover Canning Co., Hanover, Pa.

J. Edward White, White Packing Co., Vienna, Ga.

DIRECTORS ELECTED TO FILL UNEXPIRED TERMS

Edward Mittelman, Hunt Foods, Inc., Fullerton, Calif.

Harlow Waggoner, Santa Clara Packing Co., San Jose, Calif.

DIRECTORS WHOSE TERMS HELD OVER

Charles Alhadeff, Whiz Fish Products Co., Seattle, Wash.

W. E. Beach, McKeon Canning Co., Inc., Burbank, Calif.

Frederic H. Bird, Medomak Canning Co., Rockland, Me.

Charles S. Bridges, Libby, McNeill & Libby, Chicago, Ill.

M. E. Brooding, California Packing Corp., San Francisco, Calif.

Carlton Clifton, Carlton Clifton & Sons, Milford, Del.

Robert C. Cosgrove, Green Giant Company, LeSueur, Minn.

George Davidson, Foster Canning, Inc., Napoleon, Ohio

Ralph Day, Marshall Canning Co., A Div. of Consolidated Food Processors, Inc., Hampton, Iowa

A. M. Erickson, California Production Div., Hawaiian Pineapple Co. Ltd., San Jose, Calif.

Thomas E. Evans, Reinbeck Canning Co., Reinbeck, Iowa

Peter Filice, Filice & Perrelli Canning Co., Inc., Richmond, Calif.

Samuel E. W. Friel, S. E. W. Friel, Queenstown, Md.

Walter Friend, Friend Brothers, Inc., Melrose, Mass.

W. T. Dixon Gibbs, Gibbs & Co., Inc., Baltimore, Md.

Percy W. Gould, Franklin Farms Products Co., Farmington, Me.

Henry McK. Haserot, Hawaiian Canneries Co. Ltd., Kapaa, Kauai, T. H.

John Hauser, The C. H. Musselman Co., Biglerville, Pa.

John C. Hemingway, H. C. Hemingway & Co., Auburn, N. Y.

Richard R. Hipke, A. T. Hipke & Sons, Inc., New Holstein, Wis.

Wesley Jense, Pleasant Grove Canning Co., Pleasant Grove, Utah

F. Lowden Jones, Walla Walla Canning Co., Walla Walla, Wash.

Leon C. Jones, J. R. Simplot Co., Caldwell, Idaho

L. M. Jones, Washington Canners Cooperative, Vancouver, Wash.

Glenn Knaub, P. J. Ritter Co., Bridgeton, N. J.

Ray Krier, The Krier Preserving Co., Belgium, Wis.

James B. Lane, Westgate-California Tuna Packing Co., San Diego, Calif.

Max Lehmann, Northwest Packing Co., Portland, Ore.

T. N. Lyons, Morgan Packing Co. Inc., Austin, Ind.

W. Allen Markham, Markham Bros. & Co., Okeechobee, Fla.

D. E. Martinelli, Lake County Cannery, Inc., Upper Lake, Calif.

Walter W. Maule, Mushroom Cooperative Canning Co., Kennett Square, Pa.

Arthur Mendonca, F. E. Booth Co. Inc., San Francisco, Calif.

R. A. Moss, Woods Cross Canning Co., Clearfield, Utah

Daniel Rosenbaum, Sugar Rose Canning Co., Tampa, Fla.

C. L. Rumberger, H. J. Heinz Company, Pittsburgh, Pa.

John C. Suerth, Gerber Products Co., Fremont, Mich.

William B. Swonger, The St. Marys Packing Co., Sidney, Ohio

M. K. Tescher, Kuner-Empson Co., Brighton, Colo.

Ryland Thomas, Griffin Manufacturing Co., Muskogee, Okla.

G. A. Turmail, Bluffton Foods, Inc., Bluffton, Ind.

Andrew Washburn, A. Washburn & Sons, Bloomington, Ill.

Elmer Williams, DeJean Packing Co., Braithwaite, La.

Walter W. Wilson, Silver Creek Preserving Corp., Silver Creek, N. Y.

S. G. Wimmer, S. G. Wimmer & Son, Christiansburg, Va.

1956 Finance Committee

The personnel of the Finance Committee was approved at the annual meeting. As announced by President Hudson, it is as follows:

George B. Morrill, Jr., Burnham & Morrill Co., Portland, Me., *Chairman*

H. J. Barnes, Kaysville Canning Corp., Kaysville, Utah

John L. Baxter, Snow Flake Canning Co., Brunswick, Me.

E. B. Cosgrove, Green Giant Company, LeSueur, Minn.

Howard T. Cumming, Curtice Brothers Co., Rochester, N. Y.

S. B. Cutright, Illinois Canning Co., Hoopeston, Ill.

Ralph O. Dulany, John H. Dulany & Son, Inc., Fruitland, Md.

Peter Filice, Filice & Perrelli Canning Co., Richmond, Calif.

William A. Free, Sr., Hungerford Packing Co., Inc., Hungerford, Pa.

R. A. Friend, Friend Brothers, Inc., Melrose, Mass.

Walter L. Graefe, Pomona Products Company, Griffin, Ga.

G. Sherwin Haxton, Haxton Foods, Inc., Oakfield, N. Y.

Fred C. Heinz, H. J. Heinz Company, Pittsburgh, Pa.
Marc C. Hutchinson, Michigan Fruit Canners, Inc., Fennville, Mich.
Adolph C. Ketzler, Bordo Products Co., Chicago, Ill.
H. F. Krimendahl, Stokely-Van Camp, Inc., Indianapolis, Ind.
D. P. Loker, Star-Kist Foods, Inc., Terminal Island, Calif.
Roy G. Lucks, California Packing Corp., San Francisco, Calif.
John F. McGovern, Green Giant Company, Le Sueur, Minn.
Edward Mittelman, Hunt Foods, Inc., Fullerton, Calif.
Ivan Moorhouse, Olympia Canning Co., Olympia, Wash.
Fred M. Moss, Idaho Canning Co., Payette, Idaho
Maxwell N. Naas, Naas Foods, Inc., Portland, Ind.
Robert C. Paulus, Paulus Bros. Packing Co., Salem, Ore.
Louis Ratzesberger, Jr., Illinois Canning Co., Hoopeston, Ill.
B. E. Richmond, Richmond-Chase Co., San Jose, Calif.
Emil Rutz, Schuckl & Co., Inc., Sunnyvale, Calif.
R. L. Smith, Kuner-Empson Co., Brighton, Colo.
Henry P. Taylor, Taylor & Caldwell, Inc., Walkerton, Va.
A. O. Verbeke, Libby, McNeill & Libby, Chicago, Ill.
H. L. Wedertz, Lakeside Packing Co., Manitowoc, Wis.
J. B. Weix, Oconomowoc Canning Co., Oconomowoc, Wis.
Oliver G. Willits, Campbell Soup Company, Camden, N. J.
E. E. Willkie, Pacific American Fisheries, Inc., Bellingham, Wash.
E. B. Woodworth, Hawaiian Pineapple Co., Ltd., San Jose, Calif.
Ray A. Yocom, Consolidated Food Processors, Inc., Chicago, Ill.

OPENING GENERAL SESSION

PRESIDING: George B. Morrill, Jr., 1955 President, N.C.A.; Burnham & Morrill Co., Portland, Me.

GREETINGS: President Morrill

REPORT of the Committee on Nominations: Louis Ratzesberger, Jr., Chairman; The Illinois Canning Co., Hoopeston, Ill.

ELECTION of Officers

N.C.A. Observance, 50th Anniversary, Federal Food and Drugs Act

ADDRESS by H. N. Riley, Member of the Citizens Advisory Committee on the Food and Drug Administration; H. J. Heinz Co., Pittsburgh

ADDRESS by Dr. K. F. Meyer, Director Emeritus of the George Williams Hooper Foundation for Medical Research, University of California, San Francisco

GREETINGS and Proclamation of New Jersey Food and Drug Week: The Honorable Grover C. Richman, Jr., Attorney General, for the Governor of New Jersey

ADDRESS by The Honorable George P. Larrick, Commissioner of Food and Drugs, Washington, D. C.

Greetings to the Convention Delegates

By George B. Morrill, Jr.
1955 President,
National Canners Association

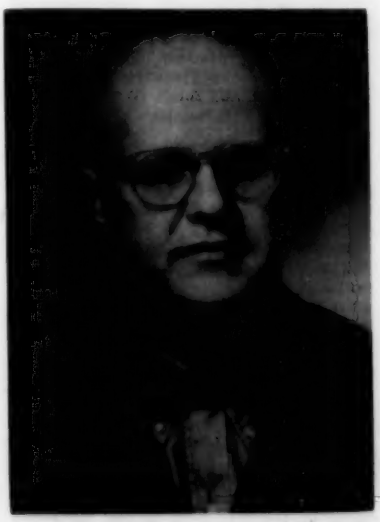
It pleasures me mightily to extend a cordial greeting and welcome to the members of the National Canners Association and our many associates and friends who are meeting with us at this time of our 49th Annual Convention.

I also want to express my sincere appreciation of the honor and privilege you bestowed on me a year ago, in entrusting me with the responsibility of carrying out the duties of the office of President of this Association. It has without question been the most exciting and rewarding year of my life, and I am convinced that whatever the future may bring, must be anticlimax. I thank you from the bottom of my heart.

There are a number of approaches which might be taken in summing up a year's experience as President of this organization. There is the statistical approach which is a sober reflection on objectives accomplished and goals as yet not reached. There is the sentimental approach involving a description of the enjoyment and exhilaration of the individual in his experiences during the year—and there is the prophetic approach in which the outgoing officer expresses his confidence, or lack thereof, in the future, and drops appropriate cliches of wisdom calculated incapable of redounding to the speaker's discomfort.

I am neither a prophet nor overly sentimental, and I believe that on an occasion such as this statistics should be cited only if the speaker wishes to put his audience to sleep. Therefore, I refer you to the Secretary's Report.

The year has been a good year for the canning industry. The Secretary's Annual Report for 1955 lays down in some detail the progress made in the various activities of the Association, and programs contemplated for the coming year. May I recommend, as have my predecessors, that you read this report carefully so that you may



GEORGE B. MORRILL, JR.
1955 President

comprehend what an outstanding contribution the Association has made this past year to the success and welfare of the industry. For those of you to whom a picture is as 10,000 words, the report has been enlivened with photographs pertinent to several of our undertakings.

This report, in words and pictures, represents the return on your membership investment in N.C.A., and the prudent member should read it with the same critical interest as he would a financial report of a corporation in which he owns shares.

Copies are being mailed to each member of the Association, and some are available at the N.C.A. Information Headquarters in this hotel.

In my ten years of active participation in the affairs of the Association prior to last year, I became acquainted with, and came to respect the talents and qualities of the members of the N.C.A. staff. Subsequently, when I assumed my duties last February, I was aware of the wealth of experience and loyalty of the men and women on whom I have leaned heavily. To all of them I want to express my thanks and appreciation for the assistance and guidance they have given me, and to all of you I want to express my opinion, that there is not a single other Association in this country, the members of which can boast of having as fine and loyal a group of men and women devoted to their interests day in and day out, as can we of the National Canners Association. From Carlos Campbell right down the line they are constantly striving to improve our raw materials, our machinery, our methods, our finished products, our relations with growers, with government, and with the public, making it ever more possible for us to present the finest, most nutritious, most tempting and least expensive canned foods for the delectation of the consumer.

To you canners and members of the allied industries who serve on our committees, I want to emphasize the importance of your contribution of time and effort in behalf of N.C.A. Lacking your intelligent devotion to the consideration and solution of our many problems exemplified by your voluntary service on these committees, the usefulness of the National Canners Association to its members would soon diminish in value. The policies and projects which are the result of the work of the committees, provide the tools and objectives without which the staff would be helpless in its work.

I want to thank all of you who have served actively this past year, in the name of the members of the National Canners Association, and I know from my own experience that you have already been richly rewarded in the satisfaction you have gained from your participation.

A large reproduction of this birthday seal, in red and gold colors, was used as one of the stage properties for the N.C.A. session, Friday, January 20, honoring the Food Law Anniversary. The seal has been adopted by the Association of Food and Drug Officials of the United States for use throughout the anniversary year.

Food and Drug Anniversary

This Association is primarily interested in food, and it is no secret or surprise that man, from the beginning of his history, has been interested in food. It is a fact that man's strongest natural instinct, above all others, is self-preservation, and to preserve himself man has had to eat from the very beginnings of his existence.

Down through history man has been at one time or another a hunter, a catcher of fishes, a barbarian, a husbandman, and an agrarian.

Climate and topography influenced his means of sustenance, always tempered by his natural proclivity for making war on his neighbor. Agrarian populations have flourished, only to die under the shadow of advancing hordes of warriors, and famine, as a result of war or nature, has time and again decimated vast populations.

Only in the last several thousands of years has man successfully established a stable agrarian civilization, and only in the last hundred years has he perfected the means of preserving and distributing food, to the end that whole populations can be supplied with a varied diet of nourishing and appetizing low-cost food every day of the year, no matter in what climate or what part of the world one chooses to live.

So rapidly did the food industry grow in the United States, particularly as a result of new methods and machines born of the industrial revolution of the last century, that of necessity in 1906, regulatory legislation was enacted by Congress in the form of the Food and Drug Law.

This year, 1956, is the 50th anniversary of the passage of that Law, and the National Canners Association in this opening session today does honor to the Food and Drug Law of 1906, to the Food and Drug Administration and its Commissioners, who have ably and conscientiously carried out their responsibilities in enforcing the Law, and to the friendly and cooperative relationship between the Food and Drug Administration and the National Canners Association down through the years.

Many changes have been made in the original Law in the past 50 years and many more will be made in the future. The National Canners Association has participated in such changes, and stands ready to cooperate with the Food and Drug Administration in the years to come in strengthening the Law wherever strengthening is needed, to further protect and improve the health and welfare of the people of the United States of America.

Address

By H. N. Riley, Member of the Citizens Advisory Committee on the Food and Drug Administration

It is a double pleasure for me to be here today. I am happy that the National Canners Association is devoting this annual meeting to the 50th anniversary of the Federal Food and Drugs Act. And I am delighted that I am one of those who is permitted to take part in this celebration program.

A well-planned schedule of events to celebrate the anniversary is being worked out by several organizations in the food industry and by the Association of Food and Drug Officials of the United States. We in N.C.A. are favored by the calendar. Since our annual meeting takes place so early in the year, we have the honor of initiating a year-long birthday party. I know of no group that deserves the honor more.

This 50th birthday year should create renewed interest by the general public in the activities of the Food and Drug Administration. Present generations are likely to have little appreciation of the national importance of this food law, and less understanding of the events that led up to its passage. Pure food and the Pure Food Law are pretty much taken for granted today. This is a great, if unintended, compliment both to the industry and the government. It means that the administration of the law, and the conduct of the industry, have been so satisfactory that the public has had little occasion to be concerned with either.

I say this attitude of indifference is a compliment, but it could lead to serious consequences. I will enlarge on this a little later.

It is difficult today to recreate the atmosphere that existed at the turn of the century, when agitation for the passage of some sort of legislation to protect the health and pocketbook of the consumer was disturbing the entire food industry. When I entered the business in 1912 as a young graduate bacteriologist, the Roman candles had pretty well stopped going off, but there was a distinct smell of burnt gunpowder still in the air. The controversies that had taken place were virulent, and the reaction of much of the industry was one little short of dismay. I have checked the word "virulent" in Webster's, and I find it means, among other things, "bitter" or "poisonous." Well, I will let it stand, for that is exactly what those controversies were.

Those of you who are on the wrong side of 60 will remember that in 1900, delegating to government the power of regulation and control over business was little practiced in this country. When the Pure Food Law was passed, most of the industry sincerely felt that they were facing destruction. The law was indeed revolutionary and drastic, but the situation that had been developing in the food industry over the years required a remedy that was revolutionary and drastic.

The food processing industry had really begun some thousands of years earlier. In the words of the *Britannica*, "The preservation of food material beyond the short term which it naturally keeps sound and eatable has engaged human thought from the earliest dawn of civilization." Men learned to preserve meat by drying it in the sun, by smoking it, and by applying that oldest of chemical preservatives, salt. They changed milk into cheese and butter, grape juice into wine, grapes into raisins. They learned these lessons through necessity, in order to keep from starving in the winter season.

Very little progress was achieved through the centuries until the first half of the 19th century. The fumbling experiments of Nicolas Appert led to heat treatment in hermetically sealed food containers. Louis Pasteur's classical researches on fermentation brought new, sounder understanding of sterilizing procedures. Together, they gave promise of keeping all types of food almost indefinitely in very nearly their natural condition at time of maturity. And, as so often happens in the history of man's progress, a devastating war—the American Civil War—gave the needed impetus that advanced the new technology.

Unfortunately, this new technology was not fully understood. The knowledge of the effect of certain chemicals in stopping spoilage was growing. The practice arose of using these chemicals in preserving food.

The idea was easily sold to the industry. The use of such chemicals as formalin, benzoic acid, boracic acid, and others, covered a multitude of sins. The product could be carelessly prepared. Cleanliness was not essential.

The public was not unaware of this. Only the shiftless and lazy bought prepared food at the groceries, instead of baking, canning, preserving and cooking it in their kitchens. I can well remember my mother's instructions to me on those rare occasions when her weekly baking failed to take care of our needs. She always said, "Son, I want you to buy the bread as quietly as possible, and when you do, come straight home. And come by the back alley."

Dr. Harvey Washington Wiley, chief chemist of the U. S. Department of Agriculture, addressed himself to the problem of use of chemicals in food over a period of years. He conducted extensive research and experiments, and found that certain chemicals then being used in food created digestive disturbances. He publicized the results widely and proposed remedial legislation.

Naturally, Dr. Wiley's proposal was highly controversial and the legislation became a political football. The annual meeting of the state food officials at the St. Louis World's Fair in 1904 provided a forum that got national interest highly aroused.

Fortunately, there were men in the food and drug industry who took a view of the proposed legislation that differed from that of the majority. I imagine that they feared government control and regulation as much as any man, and I am sure they knew there were many phases of American enterprise where the federal government should never be permitted to intervene. But they knew that where health and safety of the public are concerned, the government, even in a free capitalist democracy, does have the right and the duty to intervene in the public interest.

What is more, these farsighted men knew that there was little hope for a sound and profitable future for their industry unless it was based on the public trust. They felt that here was a means by which the food industry could gain the confidence of the individual citizen—confidence which was wholly essential if the processing of food was to develop into one of the nation's major industries.

These men joined Dr. Wiley, civic groups, women's clubs, and other organizations in a long campaign to pass legislation against the improper commercial preparation and preservation of foods. Their work resulted in enactment of the Federal Food and Drugs Act—the "Pure Food Law"—on June 30, 1906, to become effective on January 1 of the following year.

The 1906 Act was launched in troubled seas and controversy raged on for almost six more years. However, in the years following the passage of the Pure Food Law, passions cooled. Under the leadership of organizations such as the National Canners Association, more and more of those engaged in the industry caught the vision of the good this legislation could do, not only for the consumer but for the industry as well.

By 1912, this belief was strong enough for the N.C.A. to make a momentous decision. It collected funds and created a well-staffed laboratory to work on the solution of the many problems facing those in the industry who wished to abide honestly by the spirit of the Act of 1906.

This step accelerated a growing desire in the industry to cooperate with public officials and so make the law fully effective. It helped to produce the unique relationship that has become the keystone of the successful administration of the Pure Food Law.

Possibly one reason for the long working cooperation between the industry and the government lies in the fact that so many of the problems that had to be resolved were technical in nature. They could be solved only

by technically trained people in the laboratory. True scientists, whether employed by private industry or the government, are influenced only by provable facts. Thus the controversies could be objectively studied and resolved without personal bias.

This may have been an important reason, but it was not the principal one. Much of the credit for the success that has been achieved in this half-century must be given to the government officials charged with enforcing the Law. Under the guidance of men like Walter Campbell, Dr. Paul B. Dunbar, Charles Crawford and now George P. Larrick, these officials developed a consistent policy of enlightened administration. Over the years, under various titles, they devoted their careers to making this law work. These men have been ideal public servants. The food industry has been most fortunate to have such men to deal with.

We are fortunate, too, in the calibre of the man chosen to head the government department under which the Food and Drug Administration falls. Secretary Marion B. Folsom is a capable and experienced businessman with a fine record of successful administration, first in private industry and now in government.

It may also be said—and I think these men would agree to its truth—that the great majority of the food industry has met good will with good will. We have sincerely tried to make enforcement of the law not too impossible a task, and, further, we have endeavored to cooperate constructively in strengthening and perfecting it. Together we have given the nation proof that the government can regulate an industry without controlling it.

And so, in this 50th anniversary of the enactment of the Pure Food Law, the government and the industry may take pride together in a half-century of notable achievement.

If an anniversary observance is restricted to only a review of the past, it is apt to be sterile. If however, from a review of the past we can refresh our vision and approach our problems with a more mature judgment, the anniversary becomes a thing of value.

All this 50 years of effort have been to one end—the protection of the public. In the last analysis, the public has benefited most from the activities arising out of the 1906 law, and these benefits have been both substantial and widespread. Much of the improvement in today's advertising copy, for instance, has been due to the influence of the law. Certainly, constant improvement in informative labeling and the elimination of much misleading information can be attributed directly to it. In the field of drugs, the protection of the public has been more dramatic than in the field of foods, but no less effective.

Unfortunately, the public, as I said at the beginning of this talk, now takes the work of the Food and Drug Administration for granted. Public attention is so taken up with other matters—the lines of communication are so filled with other affairs—the work is being done so quietly and efficiently—that our people are not aware of the job that is still being done for them, much less of the job that still remains to be done.

It was some concern to many of us when Congress recently found it necessary—in conformity to their policy of reducing expenditures, which we all supported—to cut back financial support for the FDA at a time when their problems were more pressing than ever. We must attribute this to its proper cause—a need for economy plus public indifference arising from a

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lack of knowledge of the work being done by FDA and its value. That there was no antagonism to FDA was evidenced by the ready response of Congress to the recommendations of a committee of citizens it had set up to study the matter.

What is the remedy? How can we guarantee that this public service will have sufficient funds to properly carry out its responsibilities?

Certainly, the Food and Drug Administration has the obligation to keep the public informed of its activities. I am not sure it has been doing this as effectively as it might. These officials belong to the dedicated type of public servant, and they are disinclined to sing their own praises. In this day and age, however, we all have to do a little singing if we are not going to be lost sight of—especially when it comes to the matter of congressional appropriations.

At the same time, I would say that praise of the Food and Drug Administration would come with better grace from the industry that is directly affected by its activities. As the old wartime posters used to say, this means *you*.

As I see it, the executives of the numerous companies within our food industry should be taking an interest in any good, worth-while program that will keep the public aware of the high standards that exist in the food and drug industry today. They should support any program that will show how these standards have been developed, and how the Food and Drug Administration helps us to maintain them.

Our industry still demands, as it did 50 years ago, broadminded, farseeing leaders who fully realize their responsibility—responsibility not only to their own companies and their own industries, but to the American economy of which we are so justly proud.

There are few things in this life that remain static, and the food business is certainly not one of them. Our industry has changed incredibly in the past 50, 20, 10 years. More than that, the changes are coming so fast that they are somewhat unnerving to a veteran like me.

In these changes in the industry, new problems in great number are constantly arising. We should welcome these problems. They are an evidence of sturdy health and the by-product of vigorous growth. They are the spice of our industrial life, and they make the future at once insecure, promising and terribly interesting.

But the problems arising from these new developments in technology, whether on the farm, in the factory, or in the field of medicine, do not lend themselves to easy or quick solutions. In the final analysis, they must be resolved by industry technicians working in full cooperation with the public's qualified agents.

We in the food industry need the Food and Drug Administration to help keep us on the right side of the road—especially at the speed we are traveling. Food and Drug needs the full cooperation of the industry if it is to succeed in protecting the public from accidents that might arise from our venturing into new unexplored fields.

Not all the younger men in our industry or in government are fully aware of this mutual responsibility and interdependence. They need to be reminded of the heritage of this 50 years of cooperative effort.

The many problems that will come with the future will produce honest differences of opinion and may well generate heat and friction. Let us never forget that we have met many such problems in the past, and let us always remember how they were solved. We have behind us a 50-year record of achievement that should enable us to approach future problems with full assurance that they can be worked out to the benefit of the industry, the public, and the nation as a whole.

Address

**By Dr. K. F. Meyer,
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The National Canners Association, assembled here at its 49th annual convention, enthusiastically joins the nationwide commemoration of the social and economic movement that culminated in the enactment of the first national food and drug law 50 years ago. As a landmark in the progress of a lusty young nation it has few equals.

It has been suggested that a broad historical account of the first Federal Food and Drugs Act of 1906 and the revision in 1938 be given in order to show the resultant benefits to the consumer and to the industry. This account will describe the scientific and administrative contributions and experiences of individuals and organizations who did the basic pioneer work. Food and drug legislation, federal and state, and those devoted servants who have administered it have brought about universal recognition of the system in this country as one of the best. Health and welfare can be protected by legislation and regulation only to a point, and beyond that point the responsibility falls on the people themselves. When properly led they can be induced to take this responsibility.

Wherever and whenever a nation has changed its economic complexion from agricultural to industrial, its population has been drawn into cities. The family then no longer raises its own food, and its distance from the producer makes food preservation a necessity. This necessity is met by food producers, processors and vendors —individuals and groups ranging in size up to large corporations. These producers, processors and purveyors in the first transitional period from rural to urban life did not have the benefit of scientific knowledge of food bacteriology and food technology. Some did not know the harmfulness of their products and innocently treated canned fruit and vegetables with coloring and preservatives then on the market that claimed, even guaranteed, to keep meat, fish and poultry fresh indefinitely. But there were deliberate deceits: Substituting cheaper for more costly ingredients and misrepresenting products, to the detriment of the purchaser and to the profit of the seller, were not uncommon. Debasement of food could not be detected until the microscope and technical methods in chemistry and bacteriology had been developed.

The first step was taken in 1850 when the Englishman Arthur H. Hannall used the microscope to distinguish between coffee and chicory or other adulterants, and with this usage the possibilities of the method were revealed.

Congress tried to institute investigation of adulteration for the first time in about 1848, but the bills introduced were invariably defeated on the ground that such legislation was unconstitutional and a matter of state, not federal, enactment. Pure food legislation was not passed in the United States until 1881, when laws were passed by New York, New Jersey and Michigan.

Public health in its early development limited its activities to control of selected aspects of man's physical environment and to enforcement of quarantine by official authority. It relied at first on legal, rather than scientific, authority; on police, rather than educational, powers.

Dr. Peter Collier, the intellectually keen and technically skillful chemist of the Division of Chemistry, Department of Agriculture, began in 1879 to extend its investigations into the field of food and drug adulteration. In all likelihood influenced by the National Sale of Food and Drug Act adopted in 1875 in Great Britain, he sounded the clarion:

> "A law carefully framed is greatly needed in this country, where adulteration and substitution are everyday practiced. Where life and health are at stake no specious arguments should prevent the speedy punishment of those unscrupulous men who are willing for the sake of gain to endanger the health of unsuspecting purchasers."

He was the first in this country to institute authoritative investigation and to recommend that adulteration be prevented.

A few years before, a 29-year-old versatile physician, Dr. Harvey Washington Wiley, after receiving an additional B. S. degree from Harvard University, returned to his alma mater, the Indiana Medical College, to devote his studies to physiology, hygiene and nutrition. On leave from Purdue University, in 1878 he came under the influence of Doctor Sell in the Imperial Health Laboratory in Berlin, who introduced him to food chemistry. Doctor Wiley went back to Indiana with a cultivated passion for examining food products, especially sugars.

Soon after his return to Lafayette he obtained an order from the Indiana State Board of Health in 1880 allowing him to examine sugars and syrups for sale in Indiana to determine whether they were adulterated. This was, in his own words, his "first participation in the fray to fight for the individual right against the vested interests." He later noted with satisfaction in his autobiography that when he had shown, in his report to the Indiana State Board of Health, the vast injury to the honey industry by adulteration of honey with glucose and had pointed out means of avoiding it, the beekeepers who had previously called his report "the Wiley lie" became his most enthusiastic supporters. This pattern repeats itself with inspiring regularity: When sound information has been presented in the proper spirit, the greater share of the industry and the public has responded.

From there on Doctor Wiley's interest in food and its relation to health grew. His life work and main contribution to preventive medicine and human welfare were not the significant legislation he instigated, but the intensive studies he immediately began when he became head of the Division of Chemistry in 1883. The scientific bulletins (in particular No. 13, issued between 1887 and 1902) and reports issued by the Division under his direction unreservedly support the praise by Secretary of Agriculture James Wilson: "The amount of chemical work on the subject of food adulteration is perhaps the largest of any similar chemical work anywhere in the history of science." Not only do the investigations include basic studies on the deleterious effects of certain preservatives, coal tar colors and other substances, they go beyond to deal with analysis of food and its nutritional value.

His investigative work led Doctor Wiley to repeatedly recommend laws against adulteration and misrepresentation in his annual reports, for example in his 1898 report:

> "The necessity of national legislation on this subject has long been apparent, for it is evident that state laws, however excellent and well executed, cannot realize their full purpose without the supplement of federal legislation."

Meanwhile the research of the Division of Chemistry and the Association of Agricultural Chemists led to the establishment of standards of identity for common food. To make the investigations more informative, a food laboratory under Dr. W. D. Bigelow was created in 1902 when the Division became the Bureau of Chemistry. Scientific evidence was needed as a basis for national food legislation, and this evidence was provided under the supervision of Dr. Bigelow.

About the same time the Division of Chemistry under Dr. Wiley was enabled by an Act of Congress to investigate food preservatives, coloring matter and other substances added to food, to determine their relation to health and to establish the principles of their use. The method of obtaining chemical and physiologic data was, for the period, daring and novel—experiments on human volunteers—the "poison squad" studies. The results, vividly described in the well-known Bulletin No. 84, aroused in "agitated fashion, ridicule and satire to tearful and vigorous protests that even in the interest of science they should cease."

Moved by the distressing apathy of the public, Dr. H. W. Wiley led a

national crusade to educate the public and to promote a law against adulteration and misbranding of food and drugs, led it with brilliance and with torrential energy.

A regulation to protect the public's health by means of sanitation may be made effective without the public's knowledge, but the principles of favorable nutrition must be applied by the individual himself. Each person must himself know what to eat, and if possible why. He must be made to realize that his personal welfare is profoundly affected by what he eats. The problem is not solved when pure and adequately nutrient food is delivered to his home; the food must be kept free from unwholesomeness. The consumer must know how to store it without spoilage and how to prepare it for the table without losing its nutrients. The only road to this goal, as Dr. Wiley very well knew, is education.

Dr. Wiley's colorful personality made him a superb spearhead for the educational efforts to awaken and mold a public opinion in favor of food control and enforcement of a pure food and drug law and to take its own responsibilities for its diet. Years of experience as a teacher had endowed him with a keen sense of humor and with skill as a raconteur. These abilities endeared him to the press and to the general public. In the words of Mark Sullivan:

> "Wiley brought to his task of popular education an unusual array of talents. He could write and speak interestingly and authoritatively. He was convincing and persuasive. . . . On the platform the forcefulness and originality of his utterances gained from the impressiveness of his appearance: his large head capping the pedestal of broad shoulders and immense chest, his salient nose shaped like the bow of an ice breaker, and his piercing eyes compelled attention. He had a keen instinct for the dramatic."

Education of the public was, as always, slow and indeed laborious, but the interested press succeeded in stimulating the apathetic public. Progress was particularly accelerated when the poison squad received due consideration in columns written by George Rothwell Brown in the *Washington Post* and other papers. The name of Dr. Wiley was made a household word. The selfless purity of his crusade brought vigorous support from outstanding women's organizations. Even the St. Louis Exposition of 1904 was used, chiefly by the Association of State Food and Dairy Departments, to promote the general education program.

Congressional leaders gradually responded to public pressure and recognized the necessity for pure food legislation. Dr. Wiley acquainted them with the problem, and with his scientific evidence he counteracted misleading information being presented by a powerful lobby against the pure food bill. Public opinion was kindled to explosive heat by a best-selling novel *The Jungle* by Upton Sinclair—a powerful realistic study of social conditions in the stockyards and packing plants of Chicago, undoubtedly the deciding factor in the enactment.

A bill was introduced in December, 1905, passed by the Senate on February 21, 1906, by the House on June 23 and became a law on June 30, when it was approved by President Theodore Roosevelt. With it America became a leader in food and drug control, aware that safe, adequate and satisfactory nutrition is a vital part of the foundation on which the public's health heavily depends. The creator of this new concept and the one principally responsible for the original food and drug law was Dr. H. W. Wiley, whose memory is respectfully honored at this historic convention.

The Bureau of Chemistry was entrusted with carrying out the purposes of the law and with developing a systematic enforcement plan. The organization of a staff and field force was wisely entrusted to loyal and exceedingly capable associates and lieutenants who zealously developed the scientific evidence, the inspirational leadership and the intelligent administration to effectuate the legislative intent. None did more than Chief Inspector (later Commissioner) Walter G. Campbell. His great service must be described, and he too must be honored.

The initial enforcement work followed much the same line that it had in England and in the individual states of the United States. At first samples were collected indiscriminately and were analyzed, and violative foods and drugs were thus sorted out from legal products. This method required the sampling of hundreds of items and had the disadvantages of spot-checking. It resulted in discrimination and faulty protection, because one manufacturer might be jeopardized for a single offense, while chronic violators went undetected. Chief Inspector Campbell introduced a more comprehensive, more thorough and safer method: Trained inspectors visited factories, mills, processing plants or areas where the food was produced. They studied raw materials and factory processes and determined the probability of violations. Here legal products were separated from illegal ones at the source, rather than leaving the separation to chance. Products dangerous to health were quickly removed from the market by seizure. Additional samples were examined only if violations were suspected. The factory inspection system furnished a means of learning the distribution and location of violative products of a single manufacturer or of an entire group.

Under Inspector Campbell's inspiration, additional improvements of method were introduced: The project system, based on the public demand that first things come first. Project one, that products containing poisonous ingredients were to receive first regulatory attention. There was no question that laws were being violated and that health was being affected adversely. Project two, hygienic violations, and three, the products of major fraud. To implement this system a force had to be trained to inspect the complicated processing of food and drugs. The application of high scientific standards of food analysis and food technology required integration of the inspection field operations with the laboratory.

Objective laboratory examinations furnishing consistently reliable results were needed to convince the courts that the adulteration observed by the inspectors indeed existed. The Bureau of Chemistry developed the necessary analytical methods. Eminently qualified chemists in this Bureau have, ever since the days of Dr. Wiley, conducted intricate studies and investigations to perfect analysis and assay. Of the many, two come to mind: Burton J. Howard developed microscopic methods to reveal decomposition in vegetable products, and Dr. Paul B. Dunbar, a brilliant junior chemist of these early days and later Commissioner, worked out classic methods of food analysis.

As new scientific facts came out of the laboratory and progress was made in the industries, the administrative attitude and enforcement adapted themselves. Industrial and social expansion influenced control methods. In addition to protecting the consumer and his interest, the administrators of the law recognized their obligation to aid manufacturers to conform with the law. In 1912 a field inspector summarized the function of the law as "a corrective rather than a punitive measure." Time has proven that the most effective way of administering this law is to educate well-intentioned manufacturers in ways of producing legally acceptable products and to penalize the less well intentioned. Whenever painstakingly collected scientific facts clarified commercial and consumer interests, the administration of the law created confidence and the desire for constructive cooperation.

In December, 1912, on the recommendation of some eminent scientists Dr. Carl L. Alsberg, an outstanding biochemist, was appointed Chief of the Bureau of Chemistry; Dr. Wiley had resigned early that year. Dr. Alsberg had vast scientific knowledge and great vision. Among his many achievements he had applied science to the benefit of agriculture and of war agencies from 1917 to 1919. He carried on the high standard of chemical research in the Bureau and raised it to enviable heights. He encouraged the food and drug industries to establish their own research laboratories to improve the processing, preserving,

storing and shipping of perishable food. He was convinced that many violations were caused by ignorance of technologic principles, not by intent to debase. His conviction that the purveyors of food and the trade organizations themselves must improve the handling of perishable commodities fitted admirably into the trend of the times.

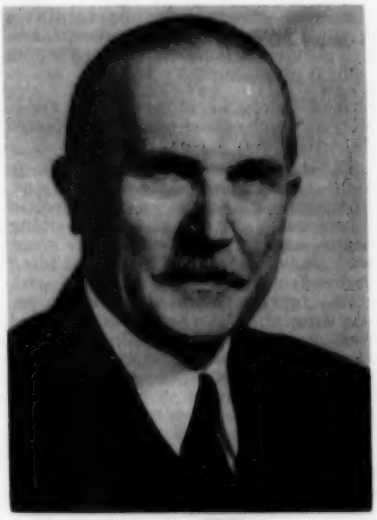
Ever since the canning process had been brought to Boston in 1820 by William Underwood and Charles Mitchell, emigrant employees from a canning factory in England, and had been improved by Thomas Kensett and the introduction of the tin can, canning had been almost synonymous with sterilization and had provided one of the best safeguards against parasites and the injurious products of putrefaction in foodstuffs.

In February, 1906, Dr. Wiley was invited to speak at an annual meeting of the Western Packers' Canned Goods Association at Atlantic City. Despite the anxieties of the President of the Association and the death-like stillness of the audience at the beginning, the Crusader explained what could be accomplished with a pure food law. He pled for a code of ethics that would exclude decayed or debased materials from interstate commerce. The response to the plea was an ovation, and the adoption of a resolution expressing gratitude for a splendid and practical address. From then on the leading canners, instead of bitterly opposing proposed legislation, became its advocates and leaders. They were fully aware that the industry was not beyond reproach. In joint session, the short-lived Western Packers Association and the Atlantic States Canners Association and the National Association of Pure Canned Goods formally memorialized Congress to pass a pure food law. This hearty and consistent support unquestionably hastened passage of the law.

But history records that those staunch and honest supporters were to become the inadvertent victims of propaganda unleashed to illustrate the need for such a law. The purity and safety of all canned food were seriously questioned by official agencies, and unfavorable reports subjected the whole canning industry and its products to criticism.

To meet the problems collectively rather than individually, the industry organized the National Canners Association in Buffalo in February of 1907, 7½ months after the Pure Food and Drugs Act was signed. The Association had to face claims that ptomaines and tin salts in canned food were a health hazard. Scientific facts were not available, and misunderstandings and a vacillating official attitude fanned by a hostile press and an avalanche of fictitious consumers' complaints created such despair that the Association considered abandonment of commercial canning altogether. But this would not have been a public service either, for the public was depending more and more on canned foods, its dietary habits having turned from cereals to milk, fruit and vegetables.

The farsighted executive committee of the National Canners Association decided that their problems could be solved only through research by competent chemists and bacteriologists. A small, and in modern terms very modestly equipped, laboratory at Bel Air, Md., enabled Dr. Robert S. Page to analyze canned food in connection with food poisoning claims. Seeing the resulting benefits, in the words of the late Secretary of the National Canners Association, Frank E. Gorrell, "the industry became more and



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more educated to the needs of research," both in the laboratory and in the factory. Several humble efforts to improve containers, materials, processes and products awakened the realization that the technical problems of canning are unique to the industry and could most favorably be solved through scientific investigations in an institution operated by the Association itself. From 1912 onward official planning for a research laboratory progressed rapidly, and in June, 1913, the Association established a laboratory purely for the industry's research and technical problems. With financial aid from the American Can Company, a building in Washington was fitted out with bacteriologic and chemical laboratories and was staffed with well qualified chemists and technologists. According to Dr. Alsberg's vision, the National Canners Association pioneered in food technologic research, and much of its progress since has been, and must remain, solidly anchored in its laboratory and the application of scientific procedure.

Leadership in research by this industry was initiated and then guided through the past 43 years through its selection and appointment of competent men. By no mere coincidence the choice of the first Chief Chemist of the new laboratory was Dr. W. D. Bigelow, Assistant Chief of the Bureau of Chemistry. He had been Chemist in the Department of Agriculture under Dr. Wiley, later Chief, Division of Foods. His scientific and administrative experience in his 21 years of Bureau service enabled him to organize his new assignment quickly and with remarkable effectiveness. Under his leadership or associated with him were a loyal group of coworkers—Dr. A. W. Bitting, F. F. Fitzgerald, H. M. Miller, H. N. Loomis, Dr. Ray W. Clough, A. E. Stevenson, Dr. Ernest D. Clark, to mention only a few—most of whom had received their early experience in the Bureau and therefore were thoroughly acquainted with enforcement of the Food and Drug Law. The laboratory in Washington, and later those in Seattle and San Francisco, developed into exemplary institutions in food research and technology. The contributions of these scientists are indelibly imprinted on the daily activities in canning factories.

It was Dr. W. D. Bigelow who first established the exact conditions of time, temperature and pH to be maintained to insure satisfactory preservation of each product in each size of can. During his life, techniques of preserving fruits and vegetables underwent vast improvement in their quality and healthfulness. This reform is largely the work of those who, under the universally esteemed leadership of this friendly scientist, brought recognition and honor to the organization they served. Dr. C. A. Browne, Adviser of Chemical Research of the U. S. Bureau of Chemistry and Soils, paid this tribute to his contemporary at the time of Dr. Bigelow's death in 1939:

> "To his old associates in the Department of Agriculture . . . he has rendered very great assistance by his advice and friendly spirit of cooperation and by his interest in the public welfare. . . . Sincerity, absence of prejudice and unselfish devotion to his work always characterized his business and social relations."

Through Dr. Bigelow's choice of a capable research staff and his continuance of his interest in the Bureau, the National Canners Association established and has maintained friendly, mutually beneficial cooperation between food research and the regulatory services of the Food and Drug Law.

Research from the three Association laboratories has been and is, as one official expressed it, "scientifically sound and thorough—reliable as to fact and interpretation—worthy of re-

spect and trust." Few organizations earn such high praise. Along with official agencies it has pursued their common goal—prevention of disease and promotion of welfare through nutrition. The present generation may not know and the older one may have forgotten the type of cooperation initiated by the National Canners Association when the official agencies were not in a position to undertake time-consuming expensive basic studies. From many interesting events a few have been chosen to illustrate the fruitfulness of this relationship:

About half a century ago canned food not treated with preservatives was charged with causing "ptomaine poisoning." The Association, after it established its small laboratory at Bel Air, investigated many cases of alleged ptomaine poisoning and proved that canned foods are not responsible for it. Publicity persisted, and even some government agencies tabulated 17,000 to 18,000 cases under the heading of ptomaine from canned foods. The propounded responsibility of ptomaines was so widely accepted that every single or mass disorder associated with the eating of food was labeled ptomaine poisoning by many physicians and the general public. The notion that putrefactive changes cause food poisoning received wide credence, and the toxicity of putrefying organic matter to experimental animals was hailed as the necessary scientific support for this notion.

The word ptomaine (from the Latin word *ptoma*, a corpse) had been coined by the Italian toxicologist Selmi in 1870 to describe secondary poisonous cleavage products of protein degradation. They appear most frequently in meat, in which they are elaborated by a great variety of bacteria. As a source of widespread intestinal illness in man such putrefactive changes can certainly be excluded.

The Association rightly concluded that an investigation should be made, under its sponsorship, at a university equipped to handle physiologic research. Various universities were approached, but in conformity with the standard of that period none was willing to accept a grant for research from a trade organization.

Finally, through the efforts of Dr. Bigelow, the National Research Council appointed an Advisory Committee on the Toxicity of Preserved Food. Under the auspices of this committee and a grant to Harvard University from the National Canners Association, from 1916 to 1921 the late Dr. M. J. Rosenau, Professor of Preventive Medicine, in a masterly manner investigated the broader aspects of illness caused by food.

At an Experimental Lunch Club, specially organized volunteers ate the contents of 1,750 cans of food of apparent prime quality, but it was learned that about 12 percent of these cans contained living, but harmless, bacteria. In this series of tests, extending over 16 months, about 15 persons daily partook of uncooked experimental food. Dr. Rosenau reported on the results:

> "No ill effects whatever could be discovered as the results of the experiment. This is not surprising when it is recalled that fresh food often contains myriads of living microorganisms; in fact, it is not expected that meat, fruits, salads be sterile. By contrast, canned foods are the safest foods that come to our table on account of the processing to which they have been subjected."

Even more pointed were his statements concerning ptomaine poisoning:

> "It is a misnomer and is often used as a refuge in cases of diagnostic uncertainty, particularly when preserved food has been eaten. The term should not be applied to food poisoning."

And finally he stressed that "it is not so much *decomposed* as *infected* food that may be dangerous."

On hand of an excellent example in 1921 he illustrated his conclusions. Some students at an eastern medical school ate a dinner of canned string beans, canned tomatoes, fresh roast pork, mashed potatoes, bread pudding and coffee, and later came down with chills, fever, abdominal pain, nausea, vomiting and diarrhea. Canned food was at once accused. But able investigators found that it was the bread pudding that contained a paratyphoid-like bacillus known to cause such an illness and that the canned foods were innocuous and in prime condition.

Despite all this evidence supported by eminent scientists, the term ptomaine poisoning has not disappeared even yet from the daily press.

After the Harvard studies, Dr. E. O. Jordan at the University of Chicago was invited by the National Canners Association to enlighten persistent claims that canned food was injurious. In an investigation of a food poisoning outbreak in 1930, associates of Dr. Jordan—Dr. W. E. Carey and Dr. G. M. Dack—examined a three-layer sponge cake with a thick cream filling and found the bacteria responsible for acute illness in 11 persons who had eaten of the cake. When a culture of organisms from this cake, staphylococci, was subsequently ingested by volunteers, it reproduced the illness the original victims had had. These experiments proved that the toxin elaborated by the staphylococcus is, under conditions favoring multiplication of this organism, the cause of the most common food poisonings.

Scientists in the laboratories of the Food and Drug Administration promptly confirmed these observations and proved that many "ready-to-eat" meats contaminated with staphylococci were potential sources of food poisoning. Proper handling and refrigeration prevent formation of the toxin.

The National Canners Association's sincere persistent determination to understand ptomaine poisoning opened an era of research and precise knowledge in food bacteriology. The men who had the vision to initiate and support this enterprise should not be forgotten by the beneficiary of their labors—the public.

Since 1735 sausage poisoning, or botulism, has been known in Europe. The causative organism was isolated from improperly cured ham in 1896, but until 1906 this food poisoning had not been identified with canned food. That year at the Alice Cooking School at Darmstadt, 11 of 21 persons died within four to five days after they had eaten a cold home-canned white bean salad. The salad had a rancid odor, but no physical signs of disintegration. This episode attracted no attention in the United States until in November of 1913, 24 young people at Stanford University ate a meal including bean salad and later developed symptoms of botulism. The diagnosis was made by Dr. Ray Lyman Wilbur, Dean of the Medical School and later President of Stanford University, who fortunately had observed some of the patients of the Darmstadt outbreak and was thereby prepared to recognize the malady. It is he who encouraged Dr. Ernest C. Dickson, also at Stanford, to conduct a thorough study of this poorly understood disease.

Beginning in 1915 Dr. Dickson and in 1918 and 1919 a group of scientists under the leadership of Dr. M. J. Rosenau and the aegis of the National Canners Association called attention to the illness and death due to improperly preserved vegetables, meat, and fruit. Their studies revealed that sterilization of foods by the cold-pack method usually employed was not sufficient if the raw vegetables had been contaminated with the spores of *Clostridium botulinum*. Little suspicion had yet fallen on commercial canning procedures.

This apparent security was catastrophically shaken, and another responsibility was willingly accepted by the canning industry. Pickled ripe olives caused botulism in 45 persons, and 33 of them died. The spectacular clinical nature and high mortality rate gave botulism an importance out of proportion to its frequency as a cause of illness or death. But R. I. Bentley, then leader of the canning industries, realized fully the gravity of the situation, emphasized by wholesale embargo on canned food imposed by several eager state health officials. The ripe olive industry, threatened by the accompanying publicity, literally begged for government supervision.

The Bureau of Chemistry appreciated the crisis and the undeniable benefit to the public of such a service, but it was not empowered to give it. (Later, in the 1938 Act, the Food and Drug Administration was authorized to obtain a temporary permit in order to deal with such emergency situa-

tions.) It therefore fell on the National Canners Association, the Canners League of California, and the California Olive Association to propose and liberally finance an investigation into the danger of botulism in canned food, how it arose, and how it could best be avoided.

In 1922 a Botulism Commission, consisting of Drs. Geiger, Dickson and Meyer, issued a special report to the Public Health Service, calling its attention to botulism resulting from commercially canned spinach. In close cooperation of the Commission with the Microbiological Laboratory of the Bureau of Chemistry, in particular with Dr. Charles Thom and Dr. Albert C. Hunter, the means of preventing botulism were discussed. The recommendations that the responsibility for safety from botulism be placed for the time being on the person who opens the can and prepares its contents for the table and that the necessity of boiling all canned nonacid vegetables before use be emphasized were offered as emergency measures by the Bureau of Chemistry.

Single cases and outbreaks were carefully studied, and it became increasingly apparent that inadequate sterilization (too low temperatures and cramming of contents of the cans) was the prime factor. In some instances the spoilage was so slight that even competent observers were misled. All investigators and processors agreed that canned foods should be processed so that sterility and sound appearance of the container at varying temperatures, altitudes and handling were ensured. But until the technological means of achieving this sterility could be learned, some system of checking the results by state cannery inspectors for the safety of the consuming public was considered obligatory.

In the first few months it became apparent that proper processing of products liable to botulinus spoilage required subjection to retort temperatures for varying lengths of time, not merely holding in a hot water bath for three hours. Technological studies on spinach processing had shown that this vegetable packed in accordance with the specifications of the Bureau of Chemistry was not safe, nor was it attractive commercially. The canners, after working out a method of preparing a safe and attractive product, negotiated with government authorities who promptly modified their specifications concerning this vegetable.

Standard, scientifically established sterilization had to replace empirical standards. It is to the credit of Dr. W. D. Bigelow and Dr. J. Russell Esty and of the many scientists of the American Can Company, among them Drs. B. S. Clark, C. Olin Ball and Fred C. Baselt, that they spared no effort to develop so-called "safe cooks." The early work in the laboratory of the National Canners Association on the thermal death time of spoilage bacteria, on the rate of penetration of heat by means of electric thermocouples and on the mathematical interpretation of data so as to arrive at a correct process were of permanent value in the precise determination of the times and temperatures necessary to destroy the highly heat-resistant spores of *Clostridium botulinum*.

Doubtless the broad research in botulism hastened the establishment of basic principles of processing that culminated in the well-known Bulletin 26-L (National Canners Association, 1930), now in its eighth edition. It is the most authoritative information about safe commercial processing of nonacid food.

As new processes were developed, limitations of a certain guaranteed process were recognized. There were possibilities of error in this process, and it allowed the operation of inadequate retort equipment, evidenced in the finding that some canned foods were understerilized. This was remedied.

One state adopted and has maintained, under the able supervision of Milton P. Duffy, a continuous rigid inspection of packing and processing by qualified inspectors to provide an additional safeguard for the consumer and to restore confidence in the safety of canned food. The experiences in this state canning inspection service point out that in public health measures all possible precautions must be taken to protect against the uncertainty of the human factor. No health official should conclude that the danger of botulism in canned food has been eliminated. The risk exists wherever and whenever the incidence of spores in the soil is high. Food processors must never become lax in the use of proper canning procedures.

The public has gained from these studies in every respect. There has not been a case of botulism due to food commercially canned in the United States since 1925. In addition the knowledge acquired has been applied to home canning, and a great deal of effort has been spent to eliminate this last source of botulism by educating the housewife. W. G. Campbell in his capacity of Commissioner of Food and Drugs in the former Federal Security Agency deserves a great deal of credit for urging government agencies that encourage home canning to recommend and to emphasize the safe processes developed during the botulism studies. Agencies that promote or give instructions in preservation of food in the home should be thoroughly familiar with the most effective, practical methods of preventing botulism.

Thus the National Canners Association, through its own laboratories and the research it has supported in the universities, with an aggregate expenditure of close to 5 million prewar dollars, has eliminated, as far as it can, a serious enemy to canned food. With its usual efficient service it has disseminated technical knowledge far and wide. In so doing it has set a brilliant example of what applied industrial research and cooperation with a federal regulatory agency can do to promote human welfare.

Turning to another facet of the relationship of the canning industry to the Federal Food and Drug Law, section 402 states that food shall be deemed adulterated "if it has been prepared, packed or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health." Shortly after the National Canners Association was organized in 1907, being aware of some shortcomings, its members set up in its by-laws certain qualifications for active membership. The member must, among other things, maintain a sanitary canning plant and conduct it in a sanitary manner. Sanitary requirements for canneries were recommended at the 1914 convention. In 1923 it adopted a sanitary code and concerned itself with waste disposal. An excellent little book, *Hygienic Fundamentals of Food Handling* (1924), written by two competent workers, Dr. Charles Thom and Dr. Albert C. Hunter of the Microbiological Laboratories of the Bureau of Chemistry, gives excellent advice. Since then many methods of detecting filth have been developed in the Food and Drug Administration laboratories.

Though the food-preserving industry became increasingly aware that sanitation assured more efficient operation, better workmanship, fewer accidents and greatly improved personnel relations, the available scientific methods were not always applied. Here the knowledge was available, but the will was weak. The first friendly warning that food manufacturers, through insanitary practices, were inviting contamination of their products with rodents hairs, insect parts and even excreta and that they might be subject to regulatory seizure of their products and even criminal prosecution made little impression. Sanitation had declined in some quarters, and a *laissez faire* attitude had crept into many food plants.

Under the impact of World War II, food processing establishments were called on to produce foodstuffs far in excess of their normal capacity. Inexperienced employees and inadequate supervision made sanitation a considerable problem. The acuteness of the situation was acknowledged when the Food and Drug Administration decided in 1945 to see that the sanitary theory and practice embodied in the federal and state pure food laws enacted in 1938 and 1939 were applied. Immediate action was indicated when sampling disclosed a deplorable lack of cleanliness in some plants.

The western group of food preservers, who had learned from experience to appreciate the significance of these findings, promptly instructed their

technical committee to develop an effective sanitation program. They did not doubt for an instant that sanitation is fundamental to food production. The question was how to balance production and sanitation, how to implement the requirements set down by law, how to effectively solve the problems. One solution—frequent inspection by government agents and enforcement of regulations—would increase the burden on the industry and on the inspection service. It would maintain only minimum standards and point out insanitation only after it had occurred. It would be of value in disclosing conditions overlooked by the well-meaning and to bring the uncooperative into conformity. A far more efficient approach—awareness of packing plant managers of the true relationship of sanitation to their entire operations—seemed more promising. Self inspection to find and correct insanitary conditions at once and to correct conditions leading to insanitation were considered by the canners themselves the most advantageous.

Again, neglect was usually attributable to lack of information or advice, rarely to deliberate intent to violate sound principle. More progress has been made through education than through supervision. Probably the most important step was taken when the National Canners Association accepted the recommendation by one of their advisers that factory sanitation be supervised by specially trained food sanitarians and that they in turn train nonprofessional persons. This nonprofessional group has since grown into a large corps of enthusiastic workers. The organization for the first time collected scattered information and made it readily accessible in the form of a manual, *Sanitation for the Food Preservation Industry*. This manual and frequent technical consultations contributed a large share. The cannery sanitation program visualized nearly 40 years ago has at last met the principal requirements of the law through an educational approach.

The program is accepted with enthusiasm and earnest devotion by most food processors because it offers them (1) the opportunity to obtain an unbiased, detailed report on the sanitation of their plants and a basis for plant improvement, (2) practical suggestions and information on sanitation developments applicable to canners, and (3) training of plant personnel.

Continuous research and study creates higher standards, and sanitation is always changing. Construction of new plants and installation of new equipment in order to comply with present standards of cleanliness create new problems that cannot be solved optimally by arbitrary orders or by enforcing the letter of a law passed to deal with different situations. The canner some years ago contemplated sanitary improvements through fear of the police. He now appreciates the benefit to the consumer's health and hence to him the producer derived from ethically desirable products.

This realization has recently been expressed by the Commissioner of the Food and Drug Administration, Dr. George P. Larrick:

> "The canning industry did not sit idly by. . . . It provided its members with technical knowledge necessary to solve the problems of the sanitary production of canned foods. This industry provides an outstanding example of self-regulation at its best."

The National Canners Association returns this compliment, that it has been a privilege to make the Federal Food, Drug, and Cosmetic Act a successful instrument in promoting health.

Freedom in its broadest sense and application is best protected by the voluntary assumption of rightful responsibilities by the people. The strength of modern society depends to an unprecedented extent on the cooperation of its members; in fact, life in a world built by science and technology is possible only if cooperation is earnest and widespread. Continuity of a society of free people requires their will to work for the common welfare. In the words of the first Director General of the World Health Organization, Dr. G. B. Chisholm,

> "Wider cooperation, leveling of barriers between man and man. Willingness to sacrifice self and group interest for common good. These are the necessities of the future."

It is these far-reaching considerations that have guided those responsible within the government and the food industries in activating the Food and Drug Law establishd in 1906. By bringing together the men of the canning and allied industries to commemorate passage of the law, they pay honor to the staunch crusaders, the scientists, the administrators and the inspectors who had the vision, the knowledge of technology, the wisdom, the intelligence and the integrity to make it an instrument of social progress.

Half a Century of Cooperation

By George P. Larrick,
Commissioner of Food and Drugs

This year we are celebrating the 50th anniversary of the passage of the first national food law, the Food and Drugs Act of 1906. Next year, your own National Canners Association will be celebrating its golden anniversary. It is no coincidence that these two events fall so closely together, for it was the passage of the Pure Food Law that led to the immediate formation of the National Canners Association, an organization established by the canners of America to assist them to discharge the responsibilities that had been placed upon them by the new law. This was the first nationwide organization of the canning industry, formed by the union of the canners' organizations of the Pacific Coast, the Midwest, and the Eastern part of the country. It was formed in recognition of the fact that the problems and interests of canners supplying food for the nation had become nationwide.

From their beginnings, your Association and those responsible for the administration of the Food and Drugs Act have worked closely together, in solving both administrative and technical problems. Repeatedly through the years we have been confronted with the same problems, and though our approach of necessity has frequently been from different viewpoints, we have both recognized that before any reasonable solution could be reached it was necessary to find out what the underlying facts were. It is in our search for facts, that the two organizations have most often and most profitably worked together.

It was only a short time after the passage of the Pure Food Law and the organization of the canning industry that the first occasion arose which underlined the need for basic factual information. Perhaps there are a few present today who remember how concerned both canners and food officials became because of the publication in "The Lancet," in early 1910, of a report by Dr. Otto Hehner, a British analyst. Dr. Hehner had analyzed a number of samples of canned tomatoes purchased on the English market and had found rather astonishing quantities of soluble tin salts in the contents. He expressed emphatically his conviction that tin in these amounts was harmful to health.

Although Dr. Hehner's results seemed incredibly high, there was no comprehensive information available on the amount of tin that might be expected in properly prepared canned foods. Likewise, although there had been no direct evidence that tin might be harmful to health, no systematic toxicological studies had ever been made to establish its harmlessness. The need for more information on both of these points was immediately apparent. To meet this need the canning industry supplied hundreds of samples of all kinds of canned food and these samples were examined by the Bureau of Chemistry, which also began studies on the toxicology of tin salts. This was the beginning of a series of investigations that ultimately established that the amount of tin

normally to be found in commercially prepared canned foods is without physiological significance.

This incident, we are informed, also led to the establishment in 1913 of the Research Laboratory of the National Canners Association. Here again, the close relationship between our two organizations may be suggested by the fact that Dr. W. D. Bigelow, Assistant Chief of the Bureau of Chemistry, was invited to be the Director of the newly established Research Laboratory. He brought with him several top-flight professional men from the Bureau, and over the years he came back and got others, some of whom are present here today. On the other hand, we were sucessful in getting from the Association Dr. L. D. Elliott, whom many of you knew as the Chief of our Interstate Division and later as Associate Commissioner, until his retirement.

With the laboratory under Dr. Bigelow's direction, the habit of close cooperation with the Bureau of Chemistry, and later with the Food and Drug Administration, became firmly established and has continued until the present day. We could cite many incidents through the years where the work of the Research Laboratory, sometimes alone, at other times with the active cooperation of the Food and Drug Administration, has resulted in obtaining and developing technical facts of benefit to the industry, the government, and to consumers alike. I will mention only a few to illustrate the point.

At the time the Research Laboratory of the Association was established, the preservation of food by the canning process was still attended by a great deal of uncertainty. Although it was known that the growth of microorganisms in the can was responsible for the large amount of food spoilage that often occurred, no reliable means had been established to insure that the heat process given any batch of canned foods was sufficient to sterilize. At that time, the effect that heat penetration, the pH of the food, and other factors had in influencing the effectiveness of the heat process had not been learned. This forced the canners to accept grave risks of heavy financial loss, of civil damage suits from allegedly injured consumers, and of possible legal actions under the Food and Drugs Act. At the same time, it placed a heavy burden of responsibility on us to keep such underprocessed foods out of the channels of trade.

We, as well as the canning industry and the general public, are indebted to the work that Dr. Bigelow and his associates did in carrying out the fundamental research on heat penetration and thermal death times, and generally in developing definite and reliable processing times and temperatures for all the different kinds of canned foods. This knowledge was especially helpful when the outbreaks of botulism from canned olives occurred. Without such knowledge the canning of olives would have stopped and all canned foods would have suffered. With it, processes could be recommended that would insure sterility in canned olives or any other food. This was a very important advance and allowed the industry to pack and sell its products with confidence. Without it, it would have been impossible for canned foods to acquire the widespread use and popularity that they enjoy today.

When minimum standards of quality for canned foods were being established in the middle 1930's, the canning industry, acting through the Association, cooperated wholeheartedly with us in developing information upon which to base such standards.

GEORGE P. LARRICK

Plants were open to us in which to prepare experimental packs of all kinds. Commercial samples that would illustrate some point under consideration were made available. Canners gave freely of their technical knowledge and skill in helping develop reasonable and worthwhile standards. Often, as when we were developing quality standards for canned peas, and again in seeking fill-of-container standards for canned fruits, teams of technical people from the two laboratories worked together preparing extensive series of investigational samples. These were then divided and examined independently in the two laboratories, with each making its results available to the other for comparison and interpretation. When agreement was reached as to what the facts were, it was usually not difficult to make interpretations and to draw conclusions that were acceptable both to the industry and to the government.

A recent illustration of the cooperation that has existed over the years is the current study of the effects of exposing food to atomic explosions. With the atomic bomb now one of the facts of life, it is important to know whether foods that have been within the range of a nuclear explosion are changed in any way that would cause them to be unsuitable or undesirable for consumption. The only way this could be learned was by direct experimentation. Accordingly, as most of you know, a series of tests was carried out last spring at the Nevada Proving Grounds of the Atomic Energy Commission. These tests were conducted under the direction of Dr. E. P. Laug of the Food and Drug Administration with the close cooperation of the food industry. The canning industry supplied hundreds of samples representing all types of food, packed in all kinds of containers. Technical men from the industry and from the Canners Association worked with Dr. Laug for many weeks in planning and carrying out the test. The results are still being studied and we are sure that when they are completed we will have acquired knowledge valuable to the industry, to law enforcement officials, and to civil defense as well.

In mentioning our joint activities in the technical field, I would not overlook the atmosphere of harmony that has generally prevailed between the FDA and the canning industry in administrative matters. The keynote of this relationship was sounded as far back as 1906 when the Western Packers of Canned Goods met with the Atlantic State Packers and the two Associations jointly passed a resolution endorsing pure food and drug legislation. After the Food and Drugs Act of 1906 was passed, we continued to enjoy the support of the majority of the canning industry as we developed our policies and enforced the provisions of the law. In fact, I am told that Dr. Wiley, the father of the 1906 Act, was chosen as the first guest speaker to address the newly-formed National Canners Association meeting in Buffalo. I am sure it was not his well-known power of persuasion alone that led to the passage of the first official resolution of the Association—a resolution urging Congress to pass an appropriation to finance enforcement of the new law.

This first Act contained no authority for establishing legal standards for foods. By the late 1920's it had become apparent that the interests of the consuming public and of the canning industry would both be better served if such standards could be promulgated. The canning industry brought this need to the attention of the Congress and successfully advocated the enactment of the McNary-Mapes Amendment to the Food and Drugs Act. This amendment, as many of you will recall, authorized the Secretary to establish minimum standards of quality or condition, and mini-

mum standards of fill-of-container for canned foods. I have already mentioned the valuable assistance in the technical field that the canning industry gave when these standards were being established. We should like also to acknowledge the support that we received from the leaders in the industry in the form of ideas, suggestions, and advice and the influence they exerted to make the newly developed standards understood and accepted by the rank and file of the industry. The staffs of your Washington office, your three laboratories, and your General Counsel have been very helpful and cooperative. We, and the public we both serve, profit from this relationship.

A major milestone in this 50 years of cooperation is the Better Salmon Control Plan. Representatives of the salmon industry had from time to time voiced dissatisfaction with our operations which involved sampling shipments at destinations throughout the country. The industry proposed that examinations of canned salmon be conducted in Seattle and other Puget Sound points where the bulk of the pack was stored.

The plan as put into effect in 1937 provided that the packers would provide our Seattle office with complete lists of their season's pack and code marks. As the salmon was received for storage in the warehouses, the laboratory of the National Canners Association, acting for the packers, would sample and examine each code. When bad material was found, the canner's laboratory would notify the packer as well as our Seattle District office. The packer would then have the bad cans sorted out and destroyed. This plan is still in effect. It has worked well and we believe has been very definitely in the interests of the consuming pubic.

In the years immediately preceding the passage of the present Act, when the need for improved legislation was being debated in Congress, the canning industry again exerted its influence in favor of new and progressive legislation. The standards-making authority was enlarged and extended, and many of the provisions of the Act that are of most importance to the consuming public had the support and endorsement of your industry.

More recently, after years of experience had showed that there was room for improvement in the method of promulgating the standards provided for in the 1938 Act, the canning industry lent vigorous support to proposals for improving procedures by which standards could be more expeditiously developed. In 1954 Congress passed the Hale Amendment to the Food, Drug, and Cosmetic Act, incorporating changes designed to bring about this improvement. The canning industry was the first to take advantage of the new provisions and a number of changes in standards have since been made with a minimum of red tape.

We have cited a few instances to show how closely your industry and the FDA have worked together during half a century to assure the American housewife that she can buy canned food with confidence and feel sure of receiving a product of recognized quality, in a properly filled container, with adequate labeling to supply her with the information she is entitled to have. This is a record of which both you and we can well be proud. It constitutes an encouraging and inspiring illustration of democracy at work, showing as it does how a great and diversified industry has been willing and able to work through the years with a regulatory agency, always with the purpose in mind of improving its products and the service that it offers the consuming public. We are confident that future years will see a continuation of close cooperation between the canning industry, its association, and the Food and Drug Administration. Fifty years has proven that you in the production of food and we in the administration of the Act jointly seek to give real meaning to the purpose of the statute, "to promote honesty and fair dealing in the interest of consumers."

Proclamation of New Jersey Food and Drug Week

Whereas, the year 1956 marks the 50th anniversary of the enactment of the Federal Pure Food and Drug Law and the splendid achievements of the American food processing industry under that law are to be celebrated nationally and by the peoples of each state; and

Whereas, throughout the past five decades the canners and other food processors of New Jersey with the guidance of the Department of Health of the State of New Jersey have played an important role in the development of higher food standards in the interest of the consumers; and

Whereas, there will be held during the week of January 20-26, 1956 at Atlantic City in this state, the 49th Annual Convention of the National Canners Association, the organization that originally sponsored the enactment of the Federal Pure Food and Drug Law of 1906 as well as the complementary New Jersey Pure Food Act;

Now Therefore I, Robert B. Meyner, Governor of the State of New Jersey, do hereby proclaim the week of January 20-26, 1956 as New Jersey Food and Drug Law Week and I direct that the Department of Health of the State of New Jersey and other state agencies join with the National Canners Association and all other professional, scientific, industrial, agricultural, labor, and civic organizations in the commemoration of the enactment of the Federal Pure Food and Drug Law, and of the achievements of the food processing industry of this state and all other states in the development of the present high levels of safety and quality of all processed foods.

Greetings

By Grover C. Richman, Jr., Attorney General, State of New Jersey

I am particularly glad to be here for this commemoration of the enactment of the Pure Food and Drug Law.

For almost ten years, as Assistant United States Attorney and as United States Attorney, it was part of my responsibility to enforce those laws in the District of New Jersey. I then realized, as I think all of us in the law enforcement business realize, that the success of that law depended not only on our activity but upon the cooperation—the wholehearted cooperation of the industry, and it was always my observation during that time that your industry was perhaps the most cooperative; that you did everything you could to assist in the efficient administration of those laws and to obtain the objectives for which they were passed.

I can never resist before an audience of this type, with people from all over the country, in saying something about this state in which I live, and of which I am very proud. I would like you to know some things about New Jersey.

We are forty-fifth in size but eighth in population. We are fifth in income per capita. We are first in farm income per area per acre. We have the dubious distinction of being first in density of vehicular traffic, but even despite that, we have for the year 1955 established the lowest highway death rate in New Jersey's history, and we hope to do even better.

This state of ours is only 166 miles at its greatest length and only 32 miles at its narrowest part. We have 125 miles of coastline; 800 lakes and ponds; 1,400 miles of trout streams; 10 state forests and 22 state parks.

We are served daily by 1,000 passenger trains, 300 freight trains, and 11,000 buses. We have two million telephones and, they tell me, we make more than eight million telephone calls a day. Considering my experience with those under the age of 20 who live in my household, I think that is an under estimation.

We have 15,000 industrial establishments that represent 90 percent of all of the industries in the country. We have a hundred resorts, a billion dollar travel industry and 25 million people visit us every year.

You are here representing one of our vital industries, and we in New Jersey are proud of the part New Jersey plays in this great field of industrial endeavor. This state produces annually more than 50 million cases of canned foods with a retail value of approximately $250 million. We have 65 canning plants who employ something like 10,000 people receiving an annual wage of over $40 million. New Jersey farmers receive an income from the canning industry for the vegetables and fruits they raise of more than $20 million a year, the third highest in the country. Last year more than 72,000 acres of vegetables were grown for processing in the state of New Jersey. There are 2,500 farmers who grew tomatoes for canning last year and 1,500 who grew asparagus. As a result, we stand second in the country in canning of asparagus and third in the canning of cranberries, tomatoes, and tomato products. Those figures represent about 12 percent of the nation's asparagus output and about the same percentage with respect to canned cranberries. New Jersey canners process over 7 percent of the nation's total production of tomatoes.

Now, recognizing all of these facts and wishing to join with you on this occasion, Governor Meyner has issued this proclamation (see page 24):

Gentlemen, on behalf of the Governor and the people of the State of New Jersey, I wish you well and welcome you to this state of ours.

CLOSING GENERAL SESSION

PRESIDING: George B. Morrill, Jr., 1955 President, N.C.A.; Burnham & Morrill Co., Portland, Me.

Where Is the Farm Problem?

ADDRESS by The Honorable Ezra Taft Benson, Secretary of Agriculture

INTRODUCTION of Contest Winner, Farm Youth Program, N.C.A.-N.J.V.G.A., by P. K. Shoemaker, Chairman, Raw Products Committee, N.C.A.

REMARKS by William Rockefeller, Phelps, N. Y., Contest Winner

ADDRESS by Howard T. Cumming, Curtice Brothers Co., Rochester, N. Y.

ADDRESS by William U. Hudson, Gerber Products Co., Oakland, Calif.

REPORT of the Committee on Resolutions: Fred C. Heinz, Chairman; H. J. Heinz Co., Pittsburgh

INSTALLATION of New Officers

Address

By the Honorable Ezra Taft Benson, Secretary of Agriculture

I am highly honored and I feel deeply my responsibility in meeting with you today.

The importance of the great canning industry to agriculture and to all the people of our nation is too obvious to need any elaboration by me. But I do want to say that, during the past 36 months, I personally have had the privilege of learning anew how vital it is for all parts of agriculture and all parts of the food industry to work together. It is with pride that I say to you today that we have made real and important progress along this vital road of cooperation.

The task of agriculture and the entire food industry is a joint one—it is the task of producing and making readily available adequate supplies of food and fiber for the health, vigor, and well-being of all our people. And surely, as we compare the varied and attractive diets of our American families with the meager, bare-subsistence diets of so many other people in the world—and with the diets of our own people a few decades ago—we must feel grateful to all those who play their part in making our standard of living possible.

The growth of the American food industry symbolizes in a special manner the growth of the entire nation—and I am thinking not only of economic growth, but of the marked improvement in levels of health and vigor, with a resultant increase of efficiency and productivity that have become part of the American birthright.

Our children today are bigger and stronger and longer-lived than were our grandparents—and I am sure that the cause is largely to be found in better nutrition.

We consume about the same poundage of food as Americans did 50 years ago, but the kinds and quality are greatly different. It has been estimated that in a recent year Americans consumed per person about 223 pounds more of such foods as meats, eggs, fish, dairy products, fruits and vegetables than they did in 1909. They offset this by eating about 222 pounds less of grain products and potatoes. Diets today are better balanced than they used to be.

Part of our present farm troubles, incidentally, stem from the fact that some of the old farm programs bucked the trend of consumer food preferences.

Now, this better nutrition did not result from the efforts of just a few people, nor from the work of just a small part of the food industry. No, it was brought about through the joint counsel and joint efforts of millions of Americans—farmers, food processors, warehousers, wholesalers, retailers, and manufacturers of equipment—as well as research and medical people, home economics workers, and a host of others. The progress in nutrition that we have made is the joint product of millions of Americans working together—under our system of free enterprise.

The part played by the canning and processing industry in this story of progress is sometimes overlooked—perhaps because it is so obvious. But we have only to think how much this progress would have been retarded had the methods and policies of 50 years ago prevailed. I trust you appreciate the vital role you have played in this drama. I am told that at least 90 percent of grocery products are now sold self-service. Without the can-

ning industry, this degree of self-service would be out of the question.

And so I am truly happy to have this opportunity to pay tribute to you for your contribution to the great work of helping to create a higher standard of living for our people.

I salute you for your role in helping to make available to the American people hundreds of varieties of canned food—food that increases materially the nutritive level of the average diet—and at the same time increases the market for our farm products.

And, indeed, that is the great long-term need of our agriculture—markets.

As you know, last year set a new record for farm production. Livestock production hit an all-time peak, and crop production was the second largest in history—just a shade below the record output of 1948. Crop yields per acre were the biggest in history—17 percent above the 1947-49 average—and this was in spite of drought, frosts, hurricanes, and floods.

Government investment in farm surpluses also hit an all-time high. The latest figures show the Commodity Credit Corporation with an investment of $8.2 billion in price-supported commodities. The corporation's inventory of farm commodities—by which I mean commodities owned outright by the government—is over $6.1 billion. Storage charges alone run about a million dollars a day.

We have made tremendous efforts to dispose of these surpluses. During the past three years we have moved into consumption more than $4 billion worth of surplus commodities—including over 800 million bushels of CCC-owned wheat and corn. Yet for each bushel equivalent of CCC stocks sold, about one and a half has replaced it in the stock piles.

We estimate that the surpluses reduced farm income by the staggering sum of more than $2 billion in 1955. In other words, net farm income last year might have been as much as 20 percent higher. Think of that!

Nor is this all. As a result of wartime incentives too long continued, markets have been lost both at home and abroad. Foreign farm production has been increased. American exports have declined. Foreign products have been attracted to our shores.

These are troubled times for families on our farms and ranches. Our nation has been blessed with unprecedented prosperity—but it is a prosperity in which families on the land have not adequately shared.

This affects all of us, no matter what segment of agriculture happens to be our particular concern. These economic reversals, as the President said last week, "are a direct threat to the well-being of all our people. . . . In America, agriculture is more than an industry; it is a way of life. Throughout our history, the family farm has given strength and vitality to our entire social order. We must keep it healthy and vigorous."

We must free the farm economy from the production distortions that had their roots in wartime needs. The plain fact—and I repeat it—is that wartime incentives were continued too long. We must provide means for cutting down surpluses. We must widen markets. We must help farmers and ranchers cut costs, balance production, and increase their incomes.

Farm people deserve their full share of this nation's prosperity. Insofar as the problems of agriculture can best be solved by government action,

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government should accept the responsibility—and we do.

We can turn the tide in agriculture—we must.

But it is going to take joint counsel and joint efforts on the part of all of us to bring it about.

On January 9, as you know, President Eisenhower sent to the Congress a special message on Agriculture. It contained the administration's recommendations for building solidly on the sound, basic program of 1954. They were my recommendations—and your recommendations—the recommendations of thousands of Americans, in agriculture and outside of it, Americans from every part of the country.

Here are our proposals:

1) *A Soil Bank*, which will: increase farm income; reduce surplus stocks; cut excess production; reduce storage costs; ease apprehension among our friends abroad; conserve soil, water, and timber resources; and strike a better balance of production and markets.

2) *Surplus Disposal* recommendations to help move CCC stocks out of the front door while the Soil Bank reduces what comes in the back door.

3) *Strengthened Commodity Programs* for individual products such as corn, wheat, cotton, rice, and dairy products.

4) *A Dollar Limit on Price Supports* has been recommended for consideration by the Congress. Such a limit would enable our family farms to compete better with huge corporation-type units.

5) *A Rural Development Program* to open wider the doors of opportunity for a million and a half farm families with incomes of less than $1,000 a year.

6) *The Great Plains Program* which will help promote a more stable economy in the agricultural empire between the prairies and the Rocky Mountains.

7) *Research* increases to help us find new crops, new markets, and new uses for our agricultural abundance.

8) *Credit* facilities which, expanded and strengthened, will aid in the transition from war to peace and help make the adjustment associated with a dynamic agriculture.

9) *The Gasoline Tax*, now paid by farmers to the federal government, would be refunded for purchases of gasoline used on farms.

This nine-point program offers no nostrums or panaceas. Our farm folks want none. Rather, it is a sound, logical attack on our most urgent problem, the surplus. It strikes at both sides of the price-cost squeeze.

We must find ways of adjusting production to the market—ways that will check the growth of surpluses. That is the purpose of the proposed soil bank.

The soil bank has two parts. Part one is an acreage reserve. It calls for a voluntary and temporary cut in production of the crops now in greatest surplus—wheat, cotton, corn, and rice. For placing acres in the reserve—acres on which there would be no cropping or grazing—farmers would receive certificates, redeemable either in commodities from CCC stocks or in cash, based on the normal net yields of the acres. The certificates should be available to farmers soon after the planting season, when compliance can be checked.

This would provide an immediate increase in farm income. It would be sure income. It would be income even in the event of crop failure. And the incentives would have to be generous enough to cause farmers voluntarily to participate in the program.

The acreage reserve offers us an opportunity to use the surplus to use up the surplus. It is practical. It is economical. It is sound. We are confident that a new buoyancy will

be reflected in markets as soon as this program is enacted into law.

The acreage reserve is not a device to empty government warehouses so they may be filled again. In future years we must avoid, as we would a plague, farm programs that would encourage a build up of price-smothering surpluses.

The second part of the soil bank proposal is a conservation reserve. Farmers will be asked to contract with the government to shift land out of cultivated crops and into forage or trees and, where feasible to ponds and reservoirs. Among other advantages, it will help prevent too many acres being diverted into vegetables and fruit. We want to solve the surplus not just spread the surpluses. Any farmer will be eligible to participate. He will be paid a fair share of the cost of establishing the forage or tree cover—up to a specified maximum amount per acre that will vary for different regions. Further, as the farmer reorganizes his farm along these soil conserving lines, we recommend that the government provide annual payments for a period of years related to the length of time needed to establish the new use of the land.

To help remove existing surpluses, we are appointing an Administrator of Agricultural Surplus Disposal in the department. He will speed up and expand surplus-disposal activity. I will continue to enlist expert help from the nation's top flight executives in the merchandising, distribution, and advertising fields. With their cooperation it is my hope that we will be able to devise vigorous campaigns to move surpluses into consumption faster.

Here again we see the need for joint counsel and joint efforts on the part of all who are vitally concerned with the welfare of agriculture—and that means all of the American people.

Though the surplus is the big problem of the present, it still remains true that the best method of promoting the long-time welfare of farm people and the nation is through adequate programs of research and education.

There is no sounder investment of tax dollars in the future of the United States—in the health, prosperity, and welfare of our people—than an investment in agricultural research, particularly in the field of new uses, new markets, new crops, improvements in our marketing mechanism, and an expansion of basic scientific knowledge.

Think what it would mean to farmers in the Great Plains and other areas if a crop could be developed to be a profitable alternative for wheat the way soybeans has been for corn.

We know that marketing margins have continued to increase until now the farmer gets only 39 cents out of the consumer's food dollar. Farm prices and farm income go down, but retail food prices stay up. Lower costs of food distribution represent a vital goal toward which more research must be directed.

In the past 15 years we have had a revolution in agriculture—in the food industry—and in the kitchen. No factor in this revolution has been more important than research.

We have seen output per man-hour in agriculture nearly double since 1940.

We have seen the annual sales of the entire food industry increase fourfold—from $16 billion to about $65 billion. And the average number of packaged food items carried in a supermarket has risen, I'm told, from about 1,500 to around 5,000.

Your industry can take a substantial share of the credit for changing the face of the American kitchen. For you have contributed to the extra service—the time-saving—the better quality—the improved nutrition—the added convenience the American homemaker buys in our food stores today.

I want to repeat that this progress has been the result of joint counsel and joint efforts on the part of millions. We have more and better foods from today's pay check because of the work of the whole food industry, from the farmer through the grocer.

And the base factor in this revolution in the kitchen—and the revolution in the food industry—was the amazing progress in the productivity of American farms.

That is why it is so terribly vital that we do what is necessary—and do it now—to improve the soundness, the stability, and the prosperity of our farm families.

Whatever the future of this country may hold—whatever progress we may make in levels of living, in standards of health, in material prosperity—much will depend on how well we fit farming to the future.

We will be able to go no faster in industry than we go in agriculture. Why? Because food always comes first. Our lives, our vitality, our ability to work, our health—all depend on food. We have been able to build the tremendous industries this country now possesses only because year after year a smaller and yet still smaller proportion of our people were needed in agriculture. Today only about 13 percent of our people are on farms. And about 2 million farms—around 40 percent of the total—produce nearly 90 percent of all farm products sold.

In the future, still more Americans will depend for their lives on still fewer farmers. We must fit our farms for the future. We must have a strong, productive, prosperous American agriculture.

We have a wide variety of research projects under way to expand markets for farm products and to increase marketing efficiency.

At the close of the past fiscal year our Agricultural Marketing Service alone was conducting marketing research under 350 projects. A whole series of studies has been under way for several years on the marketing of fruits and vegetables. We are cooperating in these studies with the agricultural experiment stations in several states. The commodities covered in these studies are citrus fruits, head lettuce, potatoes, sweet corn, apples, plums, and pears. The program seeks, first, to locate and evaluate the reasons for plant inefficiencies; and second to develop economic models as a basis for testing the efficiency of specific plant operations and eliminate bottlenecks that result from ineffective use of labor or equipment.

There is an urgent need for facts about the market place—facts that can be used to improve merchandising and promotion.

We are seeking through research to find improved merchandising methods to increase demand for some products, including butter, cheese, winter pears, and red sour cherries.

Three national surveys are under way to obtain valuable consumer-preference information on various commodities.

Sometimes research can solve directly various problems of growers, processors, and shippers. Here is an example. A potato-peeling firm was threatened with severe financial loss. Customers were complaining of off-flavors, and they were rejecting a high percentage of the product. Scientists found that the peeled potatoes retained too high a temperature after being treated to prevent discoloration. Once the cause was determined, the answer was simple—a little ice did the trick.

Research in handling of fruit shows how labor costs can be cut. There are newly developed methods of transporting cherries in water from orchards to canneries, procedures for orchard grading and better handling of apples, and now picking routines that increase efficiency of apple picking labor by 5 to 10 percent. We are driving hard at this whole question of more effective handling of crops.

We have research that is designed to expand markets for horticultural crops: new vegetable snacks, for example, such as carrot and parsnip chips, beet chips, and lima bean and pea nuggets. Research has shown that it can open up new uses, new markets, so that the benefits of our agricultural abundance can be more widely distributed.

Marketing research has already shown how to improve retail handling and display—how to eliminate some of the waste in terminal markets—how to speed up the check-out process in stores and supermarkets. But—and there is always a "but"—there

is so much more to be done—so much more for all of us to do.

We are seeking the broadest possible approach to research problems and needs through the research advisory committees. Cooperation between industry and government in agricultural research is good. By joint counsel and joint efforts we can make it better. I am sure that the Department lacks adequate information on what industry is doing, and industry lacks enough information on what we are doing.

Surely there is a way for us to develop a better exchange of information. We all want to get as much stimulation as possible for cross-fertilization of ideas among scientists. We also must prevent unnecessary duplication.

Industry has a big stake in basic research. I wonder, therefore, if private industries cannot do more than they are now doing to support basic research through grants to universities. Many corporations are already following this policy. I challenge you, and industry, in general, to create more basic research. We need it for many reasons. It is the foundation upon which advances in applied research are built.

I challenge you also to step up the tempo of marketing research to help move agricultural products into use. Your industry—the entire food processing industry—has a tremendous stake in solving this problem. A progressive processing industry is vital to American agriculture, and a sound agriculture is no less essential to processors. It is my conviction that our very freedom is involved in meeting this challenge of the surplus.

The outlook for your industry in 1956 is good. Consumer income is at its all-time peak. The economy is thoroughly sound and steadily going forward. A balanced budget is in prospect for this fiscal year and a balanced budget has been sent to Congress for fiscal 1957. The dollar has been stabilized. A dollar saved in 1953 is still worth a dollar today.

Total supplies of canned vegetables this season are not expected to differ much from last season and there will probably be some increase in canned fruits. We expect demand for canned fruits and vegetables to continue strong.

Given freedom and a spirit of real cooperation throughout the food industry, we have every reason to be optimistic about the future.

The improvements we are recommending in the basic farm program are, as President Eisenhower has said, "a workable approach to reducing the surpluses, bringing production and markets into balance at fair prices, and so raising the income and advancing the security of our farm families." This is a program to "speed the transition to a stable, prosperous, and free peacetime agriculture with a bright future."

We have measured our farm policies on the basis of what is good for the farmer and the nation—not on the political applause meter. We have tremendous faith in the sound judgment of a free and informed people.

May a kind Providence help us meet the challenge to keep America strong—strong in its agriculture and its industry—strong economically and socially—strong in the integrity, moral courage, and spirituality of her people.

The N.C.A. Farm Youth Program

By P. K. Shoemaker, Chairman, N.C.A. Raw Products Committee

The Farm Youth Program was initiated and sponsored by N.C.A. during 1955 in an effort to highlight the canning industry's interest in raw product research and development. We worked in cooperation with National Junior Vegetable Growers Association. N.J.V.G.A. was chosen as the organization to support because it is an established and recognized national youth organization interested only in the field of horticulture, and sponsors an excellent and well-recognized program of educational activities.

N.C.A. sponsored the Farm Youth Program for young growers who undertake the production and marketing of canning crops as projects submitted in a contest administered by N.J.V.G.A. A pilot program was inaugurated in 1955, with plans to enlarge the program in 1956 so as to include all states in which canning crops are grown and processed. On a national scale, participants between the ages of 14 and 21 compete for N.C.A. awards at local, state, and national levels. Through this program the association aims to stimulate youth's interest in the production of canning crops and to promote better canner-grower relations. Also by using the facilities of the Consumer and Trade Relations Program, publicizing of this human interest material helps tell the story of the industry's constant efforts to improve the quality of its products through raw products research.

The program is carried out through appointment of a Farm Youth Program Committee made up of one canner in each of the important canning states to stimulate the interest of boys and girls who might wish to enter the contest and to work closely with the state leader of N.J.V.G.A. Generally, he is the extension specialist in horticulture. N.C.A. also provided funds through N.J.V.G.A. for contest awards and for recognition of winners.

The program is supervised by Prof. Grant B. Snyder, adult advisor and chairman of the board of the N.J.V.G.A., and Dr. C. H. Mahoney, our Raw Products Research Bureau Director.

In the limited program started in 1955 we were able to provide contestants in 6 states: New York, Louisiana, Illinois, Tennessee, Kentucky, Indiana, and California. There were 11 states awards and one state winner in the 6 states in 1955, and one national award—to Bill Rockefeller, who is with us today.

Now, Mr. Secretary, we will deem it a great honor if you will present the N.C.A. plaque to the winner of the Canning Crop Project. Thank you.

Presentation of Farm Youth Plaque

Secretary Benson: It is always gratifying to salute a young American for outstanding achievement in his calling. It is particularly gratifying to single out a young American for achivement in any branch of agriculture, an industry and a way of life which is closest to my heart.

And I am happy on this occasion to take part in honoring William Rockefeller, winner of the Canning Crops Contest sponsored by the Junior Vegetable Growers Association and the National Canners Association. William, I understand you were declared the winner on two counts—successful growing of beets and successful management of the cost factors involved. I compliment you on your skill in achieving a record which I am told is truly remarkable. I am not going to be worried too much about the farm problem of the nation with youngsters like you coming on the scene.

It is a great honor and a pleasure. William Rockefeller, to present you this plaque, engraved with your outstanding 1955 gardening achievement. Would you care to tell us, for the benefit of other young vegetable farmers, just how you won this award?

William Rockefeller: Mr. Secretary, I thank you, the National Junior Vegetable Growers Association and the National Canners Association for this award. I am going to be proud to show it.

Well, Mr. Secretary, I tried to use the most improved practices. I studied all of the technical information I could get my hands on. I pumped my high school ag teacher for his best ideas.

First I decided I should apply both salt and boron to the field, so as to eliminate any defects in the crop that might come from deficiency in the soil.

Then, you must have heard, Mr. Secretary, that we had quite a drought in New York State last year. So I decided that in order to get this crop up and get myself a good yield I'd better irrigate. We have water near the field, so I irrigated with lightweight aluminum pipe. I put on eleven applications of water within nine days time, and got a beautiful stand.

By irrigating I felt I got the fullest use out of the fertilizer and boron. I used 5-10-10 fertilizer, 900 pounds to the acre, and 50 pounds of boron to the acre.

I not only got my 20 tons per acre but I got a high percentage of the higher priced No. 1 small beets which the canner wanted. So everybody was happy.

It certainly has been a thrill to come to this big convention and to meet you and hear your speech, Mr. Secretary, and I'm sure going to show this plaque to everybody I know.

Vegetables for Canning

By Howard T. Cumming,
Curtice Brothers Co.

Before getting into a discussion of the farm problem—as we in the canning industry, particularly the canners of vegetables, are concerned with it—I want to refer very briefly to the over-all farm problem. We are in a presidential election year and that, to a considerable extent, explains why so much publicity is being given to farm policy at the present time.

The critics of the Administration are pointing out with great emphasis that the farmer's income is declining at a precipitous rate. They are accentuating and parading before us every misfortune of the farmer during this period of recovery from the ill effects of a past policy which has created unmanageable surpluses, declining prices and depressed markets for some important commodities. They would have us believe that the farmer's economic future is threatened and that this may lead us into a nationwide depression. The Administration is being charged with failure to solve these problems.

Admittedly, there are serious problems to be faced, but certainly there has been no sign of a failure to meet them squarely. Moreover, the farm picture is being distorted. While it is true that total farm income is declining, it must be remembered that the total farm population has declined 29 percent since 1939. Furthermore, only about two-thirds of the farms included in the usually quoted total of 5 million are actually commercial farms (Table 1). Nine hundred thousand or almost one-fifth of all farms were classified in the 1954 census as "residential" with a value of farm products sold of less than $250. Another 600,000 were part-time farms where the farm operator worked off the farm more than 100 days in the year and where, in most cases, the non-farm income was greater than the value of the farm products sold. Figures on farm income can be deceptive when you realize that only two million farms are responsible for the production of approximately 85 percent of the total food and fiber marketed. The average dollar investment per farm worker today is almost $15,000—four times what it was in 1940.

Total debt of farmers, while although at a record high of $15.5 billion, represents only 9.5 percent of total farm assets (Table 2). In 1940, just prior to World War II, farm debt amounted to 17.8 percent of total assets. Today's farm debt in relation to farm assets stands at about exactly the same point as it did in 1944, when farm conditions were generally considered excellent.

The fact is that the standard of farm living has substantially kept pace with that of the industrial worker, and with that of the rest of us. The farmer *has not been* the forgotten man, and he *is not* forgotten, nor is he headed for disaster.

In the interest of accuracy and fairness, and as a preliminary to any discussion of agricultural problems, we should see both sides of the picture. I should like to express the hope—with me a conviction—that if we may have the same type of capable, courageous, persistent and devoted leadership in the future which has characterized the immediate past, we may confidently look forward to an orderly solution of these problems.

TABLE 1

NUMBER OF U. S. FARMS BY TYPE, 1950 AND 1954

	1950		1954	
	Number (thousands)	Percent	Number (thousands)	Percent
Total farms	5,382	100.0	4,782	100.0
Commercial farms	3,704	68.8	3,327	69.6
Part-time farms	642	11.9	574	12.0
Residential farms	936	19.3	879	18.4
Institutional and other farms			3	(a)
Commercial farms	3,704	100.0	3,327	100.0
Class I	106	2.9	134	4.0
Class II	386	10.4	449	13.5
Class III	726	19.6	707	21.3
Class IV	882	23.8	811	24.4
Class V	896	24.2	763	22.9
Class VI	708	19.1	462	13.9

The six classes of commercial farms are based upon the total value of all farm products sold, as follows:

Class I	$25,000 or more
Class II	$10,000 to $24,999
Class III	$ 5,000 to $ 9,999
Class IV	$ 2,500 to $ 4,999
Class V	$ 1,200 to $ 2,499
Class VI	*$ 250 to $ 1,199

*Provided the farm operator worked off the farm less than 100 days, or provided the income the farm operator or his family received from non-farm sources was less than the value of all farm products sold.

(a) Less than 0.1 percent.

Source: *1954 Census of Agriculture*, Bureau of the Census, U. S. Department of Commerce.

But our immediate interest today is in vegetable crops for processing, and how they fit into the over-all picture. Can it fairly be said that the growers of these crops fit the pattern that is causing so much concern?

Let's for a minute examine the mechanics that determine the prices of peas, corn, beans, tomatoes, and so forth. Both growers and canners deal with highly perishable and therefore speculative crops. Many years ago those who originated the canning industry recognized the need both for extending the period of availability of vegetables and for spreading the risk of growing and marketing them. The canners, through their preservation and storage of billions of cans, greatly expanded their market. They made them available everywhere and at all times. They gave to vegetables the characteristics of non-perishability and quality which explains their extra-ordinary development as a food product.

But, perhaps even more important, the canners devised and developed a method of buying these crops which substantially relieved the grower of the economic penalties of overproduction. Overproduction and the creation of harmful surpluses are the result either of questionable judgment, of over-pricing, or of the excessive yields which nature from time to time provides, and over which we have no control. The penalty ordinarily would be depressed prices all along the line. The problem was to spread the risk under such circumstances, and at the same time afford the grower complete freedom of choice.

TABLE 2

TOTAL FARM DEBT, U. S., 1940-1955

Year	Non-real estate debt	Real estate debt	Total farm debt	Farm debt as percent of total assets
	(billion dollars)	(billion dollars)	(billion dollars)	(percent)
1940	3.0	6.6	9.6	17.6
1941	3.3	6.5	9.8	17.4
1942	3.5	6.4	9.9	15.3
1943	3.2	6.0	9.2	12.1
1944	2.9	5.4	8.3	9.6
1945	2.7	4.9	7.6	7.8
1946	2.9	4.8	7.7	7.2
1947	3.5	4.9	8.4	7.0
1948	4.1	5.1	9.2	7.0
1949	4.9	5.3	10.2	7.3
1950	5.2	5.6	10.8	7.8
1951	6.2	6.1	12.3	7.9
1952	7.3	6.6	13.9	8.2
1953	7.6	7.2	14.8	8.9
1954	7.0	7.7	14.7	9.1
1955	7.3	8.2	15.5	9.5

Source: Agricultural Marketing Service, U. S. Department of Agriculture.

The solution was found in the grower-canner contract—which both describes the conditions under which the crop is to be grown and sets the price of the commodity. This contract is negotiated between the canner and his growers in advance of the growing season. The grower first has the choice of determining whether or not he will grow the crop at all. If he so decides the terms are agreed upon at a time when both parties are in a position to survey the canned goods market and to exercise judgment as to the size and value of the crop to be grown. If a substantial carry-over into the new season is then threatened, there is a natural and proper tendency to lower prices and reduce packs. If a shortage is threatened, the opposite takes place—with increased prices and expanded production.

From a grower point of view, the critical point in the contracting process is reached when a price is agreed upon. At that moment the grower is provided with a support price for his crop—one that he himself has chosen to accept. From then on, he has no further worry as to the market or price for his crop, whether an oversupply or an under-supply develops. If that crop in the form of canned vegetables declines in value for any reason whatever, it is his concern in only the most indirect sense.

This price mechanism may truthfully be said to provide not only a grower support price for the crop but a price that is flexible to the advantage of both parties. Its flexibility is not tied to outdated formulae but rather to the economic forces of supply and demand, which in the long run will be controlling under any conditions. Such surpluses of vegetables for processing as may develop are not stored in government warehouses to be ultimately peddled at a sacrifice, but are placed in the hands of processors who, of neccessity, must find the market for them, thereby opening the channels for further production.

What has happened to the grower of vegetables for processing under this system? Has his business expanded? What is his future outlook? Let's look at the record.

During the prewar years (1935-39) the average annual pack of canned peas was 21 million cases (Table 3). In 1955 it was over 29 million cases. Prewar we produced 18 million cases of canned corn, whereas the average pack for the past five years has been 29 million cases. The total tonnage of tomatoes going into all canned tomato products has increased from 1.9 million tons in (1935-39) to 3.4 million tons during the past five years, an increase of 80 percent.

The pack of canned green beans has shown even more spectacular growth—from an average of 7.3 million cases prewar to an average pack of 18.6 million during the past five years; 2½ times the prewar pack.

The record of prices paid farmers for vegetables for canning in relation to the parity prices for these crops is equally impressive (Table 4). When the prices that growers received for sweet corn, peas, tomatoes and beans for canning are compared with their parity prices each year, the record shows that the grower received a price which was above 90 percent of parity in every one of the past 25 years for peas; in 16 of those 25 years for sweet corn; in 12 of those years for tomatoes and in 15 of the 25 years for beans. This compares with a price above 90 percent of parity for field corn in 10 of these 25 years, in

TABLE 3

PACKS OF MAJOR CANNED VEGETABLES AND PRODUCTION OF TOMATOES FOR PROCESSING, 1935-39 AND 1951-55

Year	Peas	Corn	Green beans	Tomatoes	Tomatoes for processing
	(millions of cases—basis 24/2)				(thousand tons)
1935	23.8	20.7	6.0	27.0	1,700
1936	16.2	14.6	5.7	24.2	1,988
1937	23.4	24.3	8.7	26.1	1,926
1938	25.4	20.8	9.1	23.0	1,743
1939	16.3	15.3	7.3	24.2	2,023
Average	21.0	18.1	7.3	24.9	1,876
1951	33.9	25.6	17.0	31.8	4,267
1952	26.5	32.3	15.8	28.0	3,523
1953	28.0	31.0	19.6	22.3	3,235
1954	24.0	30.6	23.9	21.8	2,698
1955	29.1	24.1	....	24.7	3,225
Average	28.3	28.7	....	25.7	3,389

Source: Pack figures from National Canners Association; tonnage of tomatoes for processing from Agricultural Marketing Service, U. S. Department of Agriculture.

TABLE 4

THE RELATIONSHIP OF SEASON AVERAGE PRICES TO PARITY PRICES, 1930-1955

Commodity	No. of years prices were above 100% of parity	No. of years prices were less than 90% of parity
Peas for processing	22	0
Sweet corn for processing	13	7
Snap beans for processing	10	9
Soybeans	9	12
Oats	8	13
Milk	8	13
Tomatoes for processing	7	12
Field corn	6	15
Beef cattle	6	17
Wheat	3	21

Source: Agricultural Marketing Service, U. S. Department of Agriculture.

4 of the years for wheat, and in 12 of these years for soy beans.

And it should be added that the canner is concerned with the welfare of his grower beyond the point of simply getting him to agree to grow so many acres of peas or corn. We conduct extensive, and, if you will, expensive programs looking to the improvement of the grower's opportunity to profit from the production of canning vegetables. Our efforts in the field of seed and fertilizer improvement, in advancing the speed of harvest, in developing improved farming practices, and in improving mechanical harvesting equipment are all designed to increase the quality, the yield per acre, and the value per ton of the commodity.

In these days when it is becoming increasingly understood that farming is developing into a business, with the farmer's return dependent upon the economies and efficiencies of volume production, the canning crop grower stands in a superior position to most other farmers. The canner's expenditures for research, in the development of new varieties of canning vegetables, his technical assistance to his growers, his service and costs in supplying plants and seeds, fertilizers and insecticides, spraying and harvesting equipment, field boxes, harvesting labor and trucking, all do much to place the canning crop grower on a par with the large-scale farm producer. The canning crop grower is no longer an isolated economic unit, but a member of a team, sharing with the canner the mutual advantages of organized mass production.

On some crops the canner's investment in the crops at the time of receipt approaches that of the grower. USDA figures on grower prices do not reflect the true cost to the canner of the crops received. In the case of peas, the best data available at this time indicates that less than 60 percent of the canner's raw material costs are reflected in the contract price to the grower.

It is sometimes asked if the advent of frozen vegetables has threatened the canning business. In view of the increase in the packs of canned vegetables, and the consistently high percentage of all vegetables that are consumed in canned form, the answer is obviously no. Thirty-seven percent of all vegetables are now consumed in the canned form as compared with 33 percent prewar (Table 5). But it should be added that, while the canning of vegetables has rapidly expanded, the freezing of vegetables also has increased by leaps and bounds. Some vegetables are frozen that are not canned at all; and some are canned and not frozen. The fact is that while canning and freezing are competitive in respect to many products, the two industries supplement each other in the grower's interest. The per capita consumption of processed vegetables, both canned and frozen, has increased from a prewar average of 30 pounds to 46.8 pounds in 1955. If a growing demand for a product is any indication of the vitality of the industry supplying it, or of the prospects for the agricultural element it supports, then the vegetable grower, across the board and over the years, has been given little cause for concern.

What reason is there to have confidence in the future of this industry? To begin with, we are dealing

HOWARD T. CUMMING

with a consumer product, and reliable projections suggest a population of over 200 million in 1970—just 15 years hence. We are not going to lack potential customers. Moreover, canned foods can be used only once. Unlike a suit of clothes, a canned vegetable can't be mended and given added life. The product is being constantly improved. The continual research efforts of canners, of their associations, and of university and government laboratories, and of others, give canned foods increasing palatability and nutritional value. The highly competitive conditions and low profit margins prevailing in the industry will insure the lowest possible consumer prices consistent with growth. Millions of dollars are being spent annually on the advertising and promotion of canned vegetables. It seems clear that canners will continue to provide an ever expanding market for the growers of vegetables.

But despite the fact that the industry has grown and prospered and promises to continue that growth and prosperity, there are those within it who feel inadequately compensated. That goes for canner and grower alike and is not altogether surprising—in fact it is natural. Some of our growers feel they can better their lot by turning to the government for support in one form or another. They have witnessed price support programs as applied to so-called basic commodities, they have seen marketing agreements employed in the dairy and other industries, and they believe such devices may offer a better prospect for them. Without questioning the motives that prompt these proposals, we can only reply that these arbitrary and artificial supports will not work in this industry. The subject has been studied time and again and each time legislative proposals resulting from those studies have been defeated. To be sure, support programs seem to promise immediate gain and future security. But in the absence of production controls they inevitably lead to over production and all ills that accompany it. When controls have been employed, they not only have failed to control, but they have lead to other ills, such as diverted acreage, that are worse than the ills they were designed to cure.

So it seems reasonable to claim that rather than try schemes that have failed in other fields, we may be better off to stick to the procedures that have produced a vigorous and growing industry.

Rather than to switch the signals, let's apply ourselves more intensely to the problems of the industry, think ing always of the welfare of all the members of the industry team, the grower, the processor, the distributor and the consumer.

TABLE 5

PROPORTION OF CIVILIAN PER CAPITA CONSUMPTION OF COMMERCIALLY PRODUCED VEGETABLES IN FRESH, CANNED AND FROZEN FORM, 1937 TO 1955

(On Fresh Equivalent Basis)

Year	Canned[a]	Fresh[b]	Frozen
	(percentage of total annual consumption)		
1937	32.1	67.3	0.6
1938	32.8	66.7	0.5
1939	32.6	66.7	0.7
1940	34.2	65.0	0.8
1941	36.3	62.8	0.9
1942	37.0	61.7	1.3
1943	36.4	62.7	0.9
1944	33.9	64.2	1.9
1945	36.5	61.6	1.9
1946	38.4	59.6	2.0
1947	36.6	60.6	2.8
1948	33.6	63.1	3.3
1949	35.2	61.4	3.4
1950	36.8	59.7	3.5
1951	37.7	57.8	4.5
1952	36.4	58.2	5.4
1953	37.2	57.2	5.6
1954	36.7	57.3	6.0
1955[c]	37.4	56.6	6.0

[a] Does not include canned potatoes or sweet potatoes and quantities consumed in soups and baby foods. [b] Excluding melons. [c] Estimated.

Source: Agricultural Marketing Service, U. S. Department of Agriculture.

Fruits for Canning

By William U. Hudson,
Gerber Products Co.

We are all familiar with the basic ingredients of today's farm problem:

(a) An unbalanced supply and demand situation, forcing the government to enter the market.

(b) Government surpluses which overhang the market, depressing farm prices.

(c) Artificial price levels resulting in many products pricing themselves out of the market.

(d) The resultant problem of declining farm income.

As a businessman and canner of fruits, I am grateful that the canning industry and its growers are not a part of this so-called farm problem. We do not have millions of cases of canned fruits resting in government warehouses. By and large, prices to consumers are at a competitive level, and the average return to fruit growers has been increasing—not declining. It can be emphatically stated that fruit crops for canning cannot be classed among those crops contributing to the national farm problem; and I cannot see why we should be confronted with any such situation in the foreseeable future.

FIGURE 1

TOTAL FARM INCOME AND INCOME FROM FRUITS FOR CANNING, 1947-54

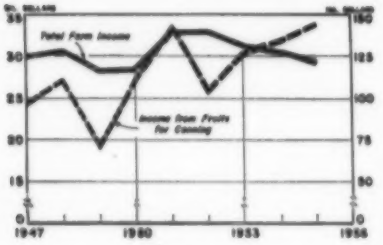

TABLE 1

VALUE OF FARM MARKETINGS: FRUIT FOR CANNING COMPARED WITH TOTAL FARM INCOME, 1947-54

Year	Cash receipts from farm marketing	Farmers' total net income	Farm income from fruits for canning
	(billions of dollars)		
1947.....	29.7	15.5	97
1948.....	30.3	17.7	110
1949.....	27.9	12.9	70
1950.....	28.4	13.7	111
1951.....	32.9	16.1	142
1952.....	32.7	14.9	103
1953.....	31.2	12.8	126
1954.....	30.2	12.3	133
1955 Est.....	29.2	11.0	143

Source: Agricultural Marketing Service, U. S. Department of Agriculture.

The record shows that, for the past four years, growers of fruits for canning have actually received each year successively higher income for the fruits that they marketed through the canning industry. Cash receipts to growers of canning fruits in 1955 were up more than one-third above the 1952 figure—from $103 million to $143 million. In contrast, cash receipts from all farm marketings declined close to 11 percent during the same period (Table 1). These facts certainly indicate that federal controls are in no way needed in the production and marketing of fruit crops for canning.

Neither the government nor the grower has to cope with accumulated surpluses of fruits for canning, which present a perpetual disposal problem overhanging the market, depressing farm prices and farm income.

I do not mean to infer that we do not, at times, have maladjustments between supply and demand, with the normal resultant economic corrections that follow; but the forces that bring about the corrections begin to function promptly and are not postponed. Extra marketing effort is exerted; and, at times, inventories are liquidated by canners at substantial losses. But, in any event, the problem is on its way toward solution. Elaborate and expensive controls and administrative machinery are not necessary.

If we compare fruits for canning with the "basic" commodities which are currently involved in the national farm problem, another significant difference becomes apparent. The artificially high prices for many of the basic commodities have caused consumers to turn to substitutes. How does this compare with the situation on fruits for canning? Today the processing industry enters into the marketing process of our fruit crops more than ever before. This is because of increased consumer demand. In the words of Dr. S. W. Shear, of the Giannini Foundation of Agricultural Economics of the University of California, and I quote:

"The large increase in fruit processing other than drying, as compared with the very small increase in fresh fruit marketing, is the most notable development in fruit utilization in the United States during the past 15 years."

Further, according to Dr. Shear, and I quote:

"The proportion of the total national fruit crop commercially processed increased from 39 percent in 1934-38 to 53 percent in 1949-53. Conversely, fresh marketings decreased from 61 percent to about 47 percent of the total fruit crop. Almost every important fruit that is adapted to processing has shown the same trend toward an increasing proportion utilized for processing and a decreasing proportion for fresh marketing."

Let us take the five major deciduous fruit crops having substantial utilization for canning, and briefly look at the expanding position of the canning industry in their over-all marketing. I am referring to apples, apricots, cling and freestone peaches, and pears (Table 2).

Cling peaches, of course, have always been marketed almost exclusively to canners. It is a crop grown for the canners and there is no other significant utilization for it. On the other hand, apricots originally were a crop marketed primarily to the dry yards, with some utilization by canners and the fresh market. Canners have, however, been taking the larger share of this crop in recent years. In 1954, canners took 59 percent of the total apricot production with 24 percent of the tonnage being utilized

FIGURE 2

TREND IN UTILIZATION OF SELECTED FRUITS FOR CANNING, 1945-54

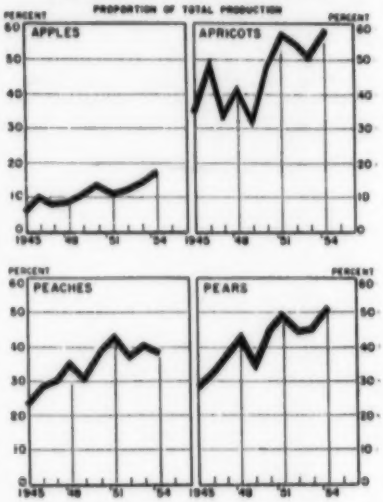

TABLE 2

TRENDS IN UTILIZATION OF FRUITS FOR CANNING, 1945-54

	All fruits	Apples	Apricots	Peaches	Pears
	(percent of total crop production)				
1945.....	11.6	5.8	35.2	23.7	28.9
1946.....	15.2	10.9	49.6	29.5	33.1
1947.....	13.8	8.0	33.0	30.6	38.2
1948.....	15.1	8.8	42.3	36.3	43.8
1949.....	14.5	10.5	31.4	30.4	34.5
1950.....	17.2	13.7	48.3	39.9	45.8
1951.....	17.1	10.7	57.9	43.5	50.0
1952.....	16.0	12.3	53.9	37.1	44.4
1953.....	18.8	14.3	50.4	40.6	45.7
1954.....	19.6	17.6	58.2	38.5	51.8

Source: Agricultural Marketing Service, U. S. Department of Agriculture.

for drying and only 16 percent for sale on the fresh market. Finally, pears, freestone peaches and apples historically enjoyed a substantial fresh market, with the canning outlet taking a secondary position. However, in recent years canners have become more important to growers of these fruits as a market channel for their production. This is particularly true of pears, where 52 percent of the total production in 1954 was canned. Also in 1954, canners took a record proportion of the national apple crop—almost 18 percent. Thus, in the case of all these fruits, a continually growing share of the total tonnage has been taken by canners as a result of reasonable prices and their aggressive market development, both at home and abroad, for the canned items.

If you combine these five major deciduous fruits, the percentage of the total crop production that is utilized in canning has increased from 11.6 percent in 1945 to 19.6 percent in 1954.

As canners we recognize that successful growers are essential to the entire canning operation since we must have good crops of high quality, for which the grower should get a fair return. With this in mind, canners have always sought to prevent the development of conditions in fruit crops like those that have placed the basic commodities in such distress.

Growers of fruit crops have had the benefits of an expanding outlet for their crops because the growth and expansion of the fruit canning industry made possible year-round usage of these perishable commodities. By aggressive merchandising, advertising, and promotion, the average annual per capita consumption of canned fruits has risen 15 percent in the last 15 years—from 17.5 to 20.2 pounds; canned fruit juices from 8.4 to 13.2 pounds (Table 3). Combined with the increase in population, this expansion is statistically reflected in the doubling of the total tonnage of deciduous fruits used for canning from 1940 to 1954—from 874,000 tons to 1,691,000 tons.

New products, also, have played a part in this ever-expanding market. Let us take, for example, fruit cocktail. Here, the canning industry, through careful research and development, introduced an entirely new canned fruit product. The overwhelming acceptance of this product by consumers expanded the market more significantly for the growers of the fruit crops used as ingredients—peaches, pears, pineapple, seedless grapes and cherries.

Another point which should not be overlooked is the indirect effect which the canning fruit market has on stabilizing the fresh fruit market. The increasing quantities of fruit which have been used for canning result in that much less tonnage going to the fresh fruit market during the short marketing season.

In other words, the constantly expanding canning market not only provides a greater outlet for growers' crops, but it also aids in a more orderly marketing of the remainder of the crop on the fresh market.

Admittedly, there are year to year fluctuations in the raw product price for fruit for canning, and sometimes these variations are substantial. However, it is this very fluctuation in price, combined with the market and promotional efforts of the canners, that is most effective in correcting a situation.

After all, when a farmer makes an investment in an orchard operation, he has a long-term investment and he expects a fair return over the life of the orchard. It can be shown that over the last 10 to 15 years a relatively good return has been realized by these growers of fruit canning crops.

During the past five years, when cash receipts from farm marketings have been declining each year, the dollars received by growers of deciduous fruits for canning have increased—a total increase of almost $40 million since 1952.

This record has been accomplished without the benefit of a government price support program or the purchasing of large volumes of canned or raw fruits that could not be marketed through normal channels and by accepted marketing practices. The relative price level of fruits for canning has been much better than that which can be cited for the basic commodities, which have been subjected to the various control and price support programs. When the prices received by growers for canning fruits are compared with their respective parity prices year by year, a much more favorable relationship is found than for the basic crops.

The record of facts and figures that has been presented here is, I believe, an outstanding example of the merits of the present marketing system which stimulates market development and earnest merchandising of fruits by the canner.

In contrast to the general situation, the farm income from these fruits for canning has been rising, canned fruit prices are competitive, and there are no surpluses in government hands.

It is clear that there is a sound foundation for the deep-seated conviction of canners that federal legislation and the attendant controls are not necessary to insure a fair and reasonable return to producers of fruits for canning.

FIGURE 3

PER CAPITA CONSUMPTION OF CANNED FRUITS AND FRUIT JUICES, 1934-55

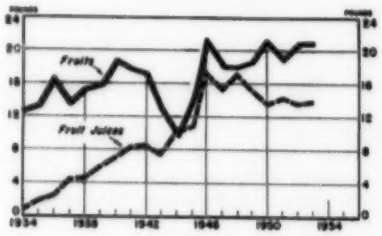

TABLE 3

PER CAPITA CONSUMPTION OF CANNED FRUITS AND FRUIT JUICES, 1934-55

Year	Fruits (pounds)	Fruit Juices (pounds)
1934	12.3	0.51
1935	13.2	1.96
1936	16.5	2.37
1937	13.3	4.43
1938	15.2	4.57
1939	15.7	5.84
1940	18.7	7.13
1941	17.5	8.38
1942	17.0	8.42
1943	12.4	7.33
1944	9.1	10.19
1945	14.2	10.78
1946	21.0	17.53
1947	17.9	15.42
1948	17.8	17.12
1949	18.5	15.06
1950	21.0	13.36
1951	18.7	14.16
1952	20.6	13.55
1953	20.6	13.69
1954	19.2	13.40
1955	20.2	13.20

Source: U. S. Department of Agriculture.

Call for 1956 Directory Copy

Questionnaire forms on which canners are asked to submit information for the compilation of the 1956 edition of the *Canners Directory* were mailed to all canners on January 20, and should be on canners' desks when they return from the Convention. These forms should be filled out and returned promptly to the N.C.A. in the self-addressed, postage-paid envelopes provided.

As in past editions, the 1956 *Canners Directory* will list the name and main office address of each canning firm, location of factories operated by each firm in each state, and the canned food products packed by each firm in each state. Canners are asked to list the states and the cities and towns in which their canning plants are located, and to identify their products according to instructions in the questionnaire.

N.C.A. Resolutions Deal with 50th Anniversary of Food and Drug Law and Interstate Trade Barriers

At the annual meeting the N.C.A. membership unanimously voted resolutions dealing with the 50th anniversary of the enactment of the Federal Pure Food Law and interstate barriers to food distribution.

These resolutions were among those reported by the Resolutions Committee, of which Fred C. Heinz is chairman.

Food and Drug Law Enforcement

On the occasion of the 50th Anniversary of the enactment of the Federal Pure Food Law in 1906, the canning industry reaffirms its support of that legislation and pledges its continued cooperation in the development of sound regulations for consumer protection. A constantly expanding population combined with widening consumer interest in all processed food has led to increasing demands upon those responsible for enforcement. The recent report of the Citizens Advisory Committee confirms industry experience that inadequate appropriations have hampered effective enforcement efforts, particularly in the area of economic violation. The canning industry recognizes that over-all government economy is essential, but urges upon the Congress that increased appropriations for enforcement of the Federal Food, Drug and Cosmetic Act be accorded the highest priority to the end that this vital work in consumer and canner protection may be effectively continued.

Interstate Barriers to Food Distribution

The canning industry continues to urge upon all state legislatures, administrative agencies, and local enforcement officials, the recognition of the paramount consumer interest in the wide and unfettered distribution of all wholesome and informatively labeled food products. State and local regulations that specify particularized labeling requirements, or that prohibit ingredients authorized by federal law, or that differently standardize products to reflect local preferences, serve only to hamper and to impede the free interstate distribution of canned foods. Regulatory requirements unnecessarily extending the adequate protections afforded by federal law create unwarranted barriers to the ultimate detriment of consumers, canners, and growers alike.

George B. Morrill, Jr.

Only in the constant replenishment of its ranks of men of high purpose and effective action can this nation endure and any organization continue to thrive. In his service as President of the National Canners Association, George Morrill, Jr., happily exemplified the vitality of that process. His penetrating knowledge of the industry derives not only from the heritage of three generations of canning skill, but also from his zest for new knowledge and his infinite capacity for hard work. These qualities were abundantly evidenced in his earlier services to the State of Maine, its canning industry, and on the committees of this Association. His vast enthusiasm is matched by tireless effort and energetic performance, his modesty accompanied by an ever gracious courtesy, his firmness tempered by a sincere respect for the views of others. With affection and esteem the canning industry gratefully acknowledges his firm leadership and valued contributions during 1955.

N.C.A. Staff

The varied problems of the canning industry impose a growing responsibility on the association staff. Each year they achieve a new bench mark of excellence in the discharge of their many and demanding responsibilities. The association expresses its sincere appreciation to Carlos Campbell and his staff for their continued loyalty, diligence, and efficient execution of their assignments.

Guest Speakers and Allied Trades

A National Canners Association convention requires the untiring efforts and cooperation of many elements only indirectly connected with the association. Our guest speakers, the allied trades, newspapers, radio, and the trade press have once again each rendered an immeasurable contribution to the success of the 1956 Convention. The association is sincerely appreciative of all they have done and directs the President and the Board of Directors to convey its gratitude to each of them.

In Memoriam

As ever during the annual cycle the Divine Shepherd has recalled from his earthly flock many dear friends whose untimely passing we sadly mourn.

Edwin J. Cameron, of the N.C.A. Staff
M. P. Cortilet
Cloyd O. Davidson
W. S. Everts
Carleton A. Friday
Leslie A. Friend
W. F. Gohlke
J. Howard Hamilton
Stewart C. Hemingway
Edward H. Jacob, Sr.
Gordon Hill Kellogg
Theodore J. Marquerite
R. W. McCreery
Happer Payne
W. L. Rowlands
George O. Tong
King S. Weeman

The Directory-Program

The official Convention Room Directory and Program were combined this year in one publication (142 pages) and made available for distribution to the delegates of the three sponsor associations and others on their respective arrival at their hotels.

The Directory section included all the listings of members of the N.C.A.; state, regional and commodity canners association headquarters; members of the N.F.B.A. and their non-canner principals; members of the C.M.&S.A. along with their exhibit booth locations; and miscellaneous delegates housed by the three sponsor associations. The Directory also included locations and phone numbers of the principal Atlantic City hotels, a map of the city, floor plans of the exhibit locations, and phone numbers and locations of the various information and registration centers. The editorial and production supervision of copy prepared by the three sponsor associations was carried out by the N.C.A. Information Division.

The Program section of the publication gave agenda details of the several program sessions held by the Association, as well as daily hour-by-hour schedules of the principal events of the over-all Convention.

The combined Program and Directory was published by courtesy of the Atlantic City Convention Bureau.

MEETING OF N. C. A. DIRECTORS

The N.C.A. Board of Directors, at its Convention meeting, Thursday January 19, approved the recommendations of the Administrative Council, as reported by Executive Secretary Carlos Campbell, for a 1956 budget of $1,359,105.00 which includes continuation of the Consumer and Trade Relations program. The current rate of N.C.A. dues—4/10th of a cent per case for seasonal items and 2/10th of a cent per case for nonseasonal—was continued.

The Directors began their activities at a luncheon, with the visiting ladies of the Food Editors Conference as their special guests.

At the request of J. C. Hemingway, Chairman of the N.C.A. Legislative Committee, Secretary Carlos Campbell showed to the food editors and presented to President George B. Morrill, Jr., a 75-year-old can of oatmeal that had been packed by the Burnham & Morrill Company, and been found recently in one of the H. C. Hemingway & Co. plants.

The Editors and Directors together first heard a speech by N.C.A. Chief Counsel H. Thomas Austern, whose remarks, reproduced on page 39 of this issue, chiefly illustrated the importance to the canning industry of the dissemination of information to the public through the food columns and broadcasts originated by the ladies. Following Mr. Austern's speech the Editors adjourned to another meeting room for their Conference, and the Directors remained in session for theirs.

First order of Board business was the report on Association finances, and this was accompanied by reports on two of the important N.C.A. activities —the Research Laboratories, by John T. Knowles, Chairman of the Scientific Research Committee, and the Consumer and Trade Relations Program, by George Anderson, head of the firm of Dudley-Anderson-Yutzy, which is retained as public relations counsel for the program. These two speeches are reproduced below and on page 37, respectively.

Among its official actions the Board passed a motion to continue for one year the following Special Committees of the Association: Conference, Procurement and Convention.

Report of the Scientific Research Committee

By John T. Knowles, Chairman, Scientific Research Committee

The research budget for 1956 can be best understood in the light of a series of developments dating back to 1952, which I should like to recount briefly.

In November, 1952, the Committee on Scientific Research recommended a $333,000 budget for the Washington and Berkeley Laboratories for 1953—about $15,000 higher than the figure eventually adopted by the Association. The Budget Committee had suggested an even greater reduction, in the interest of keeping expenditures within anticipated income. This was, of course, a very correct fiscal objective, but it left the Research Committee with the feeling that it needed better guideposts for the planning of future research programs to meet the needs of the Association.

In turn, this raised the question of where the research activities fit into the whole Association program. At the suggestion of the Research Committee, a Function Analysis Committee was set up in 1953 and it made a rather thorough analysis of the functions and expenditures of all the divisions of the Association. As a result, it was shown where the money had been going, according to types of activity, over a period of years. This type of information was, of course, helpful to the Budget Committee, but the Research Committee felt that still further information could well be developed to indicate what kind of a research program, and how large, the Association would be wise to maintain. This was still a matter of divergent opinion.

To gather some more facts bearing on this, the Research Committee appointed a Task Committee of its own. This Task Committee first undertook to find out what services of the laboratories are used by the members of the Association, to what extent, and by whom.

One approach to this was a questionnaire sent to all members of the Board of Directors. The other was a detailed study of all services given by the laboratories over a 5-year period. This latter study brought out a number of interesting points. One striking fact was that, contrary to our expectations, the companies making most extensive use of the N.C.A. Laboratories are the large companies having laboratories of their own. Yet often the administrative officers of those same companies had no idea that this was the case; their technical people knew and made use of the help of the N.C.A. Research Laboratories, but this was in a field of day-to-day operation that the head of a large company usually doesn't have to concern himself with.

These 1954 surveys showed us that the services of the laboratories are widely used and appreciated, at least they are appreciated by those who know that they have been utilized. However, more than half the laboratory program is not service but research, and we needed to bring that into better focus, too.

Therefore, in 1955, the Task Committee working with the two Laboratories, compiled a comprehensive analysis of all the activities of the Laboratories, past, present, and hoped for. This was divided into three parts, one summarizing the achievements of the Laboratories down to the present, the second covering projects now going on, and the final one describing lines of work that should be tackled in the future. This was all included in a report of some 54 pages, replete with pictures, entitled "The National Canners Association Research Laboratories, Past, Present, Future." This was reproduced and sent to all members of the Administrative Council in advance of their meeting last December.

I'd like to read you a few extracts from the brief introduction to that report:

"The National Canners Association was one of the first industrial groups to recognize the benefits to be gained from research, and over the years has established an enviable reputation in the field of food preservation. This was well expressed by the Commissioner of the Federal Food and Drug Administration, Mr. George P. Larrick, when in commenting on early activities of the Food and Drug Administration and some of the problems of spoilage and sanitation which confronted the canning industry, he said: 'The canning industry did not sit idly by. The National Canners Association established its own laboratories. It provided its members with the technical knowledge necessary to solve the problems of the sanitary production of canned foods. This industry provided an outstanding example of self-regulation at its best. The fact that next year will mark almost half a century of cooperation between the National Canners Association Laboratories and the Food and Drug Administration suggests that the relationship is more than temporary.'

"This and many other tributes show that apart from the direct benefits rendered by the laboratories to the technology of canning, their professional stature and integrity have added luster to the National Canners Association and the canning industry.

"It may be instructive to recall the atmosphere in which the laboratories first came into being in 1913. At that time the industry suffered from frequent instances of unfavorable publicity due to unfounded reports of

'ptomaine poisoning' attributed to canned foods, and other newspaper stories reflecting prejudice against canned foods. This situation influenced the thinking of many in giving initial support to a research program. While it was recognized that scientific research had helped other industries and probably could help the canning industry to improve its products and methods, at the outset the need for improving the prestige of the industry and its products was uppermost.

"In the years since 1913 the laboratories have turned their hands to many problems arising from needs of the industry, but have held steadily to the aim of protecting the integrity and reputation of canned foods. This remains today the most important function of the laboratories.

"The purposes of the laboratories are constructive and protective, to guide the industry into secure new paths and away from pitfalls. For example, only a few years ago the premature publicizing of subtilin as an aid in canning created a nation-wide stir of excitement. It was the careful work of the N.C.A. Laboratories that showed the fatal dangers in this method. Thus at nominal expense the N.C.A. saved the industry from spending great sums on individual research and from the grave consequences of using the method commercially.

A Look to the Future

"Nothing is permanent except change. Change in the practices of the canning industry and in its environment constantly brings new problems to challenge the research abilities of the N.C.A. Laboratories. Methods of sterilization by heat have been changing, and the laboratories have been active in defining the conditions for their successful operation. Canners must meet more and more stringent requirements as to disposal of waste, and the laboratories are helping them find the means of doing so. In some areas, serious water shortages have developed and are getting worse; the N.C.A. Laboratories are showing how to do the same job with less water. The flood of new pesticides constantly being issued presents canners with a problem of residue detection; the N.C.A. Laboratories believe they have an answer to this in their version of a fly bioassay method. These and allied problems present their own challenge.

"There are other problems, many of them, awaiting attack. Some of these mean much in maintaining or improving the competitive position of canned foods in the market. There is room for quality improvement in many foods through changes in technology; these must be based on research. Overcoming the loss of color of green vegetables, for example, could greatly improve the popularity of these important products. The same could be said of flavor in some products, and there may be other forms of pack which would better suit the consumer's needs. The nutritive values of canned foods, while in general well retained, might be brought to a higher and more uniform level in some cases.

"New packaging materials are continually under development. Some of these may eventually be of importance to the canning industry. If so there is a job of evaluation and adaptation, and the N.C.A. Laboratories might well have a part in this.

The study of canning equipment, aimed at improving its sanitary functioning, has already begun and should be continued; the experience of other industries shows that great strides can be made. Here again, the N.C.A. laboratories have an opportunity for constructive action.

"The laboratories have had an important part in the research already completed on 'cold' sterilization, and are continuing to gather needed basic information. The future prospects of this process are still vague. It may strongly affect the canning industry or it may not. At least until that question can be answered with more assurance, the N.C.A. Laboratories should do what they can to determine the possibilities in radiation sterilization."

At the December meeting the Administrative Council gave the Research Committee full opportunity to present the results of these studies that have been going on, and in fact to acquaint the Council with any and all features of the N.C.A. research program. This we endeavored to do in four ways.

First, we reviewed the contents of the report that I just spoke about.

Second, the chairmen of the Western and Washington Laboratory Committees gave a brief analysis of the personnel groupings and principal functions in the respective Laboratories.

Third, we presented the 1956 budgets in a new form, broken down by projects, with a price tag for each project, based on estimated labor, travel, and operating costs.

Fourth, we presented a series of new projects that deserve attention in the future, and explained their significance. These, too, carried estimated price tags. They represent jobs that we can see right now as needing to be done in the next few years.

The point we wanted to make, and the Administrative Council grasped it at once, is that a good research program needs to look ahead more than a year, not only in the jobs to be done but in the means of doing them. Personnel must be trained, and when they have become valuable it should be possible to offer them some hope of security and advancement. Our laboratories have built a fine record over the years, but it wasn't done with pick-up labor; it was done by loyal staff members who had spent years learning their jobs.

Incidentally, the staffs of both laboratories have suffered sharp losses in the past two years, through the death of Dr. Esty, Dr. Cameron, and Mr. Sanborn, and through the resignation of several other valued workers. Replacements are needed, not alone to maintain the functions of the laboratories but to provide a continuation of trained and skillful workers in the future.

The Administrative Council appeared to be pleased with this manner of presentation. They were kind enough to say that it had given them a better understanding of what the research program of the N.C.A. is all about than they had had before. They wanted it to go on, and wanted it to include long-term objectives as well as immediate aims. They recommended for the Budget Committee's consideration the basic budgets submitted for the two Laboratories, plus funds for several new lines of work.

Many other new lines of work could be properly considered if funds and personnel were available. For example, the Consumers Service Committee of the Association would like to see an extension and in some part a repetition of the work on nutrients in canned foods that has been done under the N.C.A.-C.M.I. Nutrition Program. To repeat the whole program under present conditions would take far more money than we have any reason to think would be forthcoming. A more modest program could be undertaken at correspondingly less cost, but even for this our committee has no indication of where the money would come from.

So much for the 1956 budget. In the coming years, we hope it will be possible to count on continuing support for a program of research and scientific service such as that I have described to you, because you and I and all of us know that the canning industry is going to go on needing new knowledge and needing to master new ways of doing things.

Report on the Consumer and Trade Relations Program

By George Anderson, Dudley-Anderson-Yutzy

In January, 1954, the National Canners Association inaugurated its Consumer and Trade Relations Program, designed to enhance the prestige of canned foods and the canned foods industry among consumers and in the trade.

For the past two years the program has been progressing according to the plan originally presented to N.C.A., under the guidance of the Consumer and Trade Relations Committee, through the cooperative efforts of the staff at N.C.A. and members of the Dudley-Anderson-Yutzy organization.

In reporting on the progress of the C & TR Program and the plans for the future, a good starting point is the "14-Point Plan of Immediate Action" which was adopted by N.C.A. two years ago. We will review the program in the light of this plan.

(1) Launch a continuing consumer relations program to clothe canned foods with prestige. During the past two years not a month has gone by without editorial mention of canned foods by some national magazine. And the great majority of these articles stress the glamour approach, an important part of the prestige program for canned foods.

A quick look at a few headlines indicates the kind of editorial support the national magazines have been giving the canning industry:

"Because of Canned Foods We Eat Better Today"—*Woman's Home Companion.*

"Shelf Magic For Short Order Cooks"—"Gourmet Turns with a Can Opener"—*Ladies' Home Journal.*

"Pantry Trousseau—1955"—*Look.*

"Meals In Minutes For After-Five Cooks"—*Charm.* "Here is the first of a series of articles to help you turn the wonderful foods you buy in cans, packages and jars into your own elegant cuisine."

"Food Fiesta"—*Family Circle.*

"Canned Foods For Better Family Meals"—*Parents.*

"One Way To A Man's Heart"—*Seventeen.*

"Short Cut Foods Revolutionize American Cooking"—*McCall's.*

"Winter Salads, Fresh As Spring"—*Better Homes and Gardens.*

"Magic From Cans"—*House and Garden.*

"Cook It The New Way"—*Better Living.*

"Good Eating—and the Cookin's Easy!"—*American Home.* "Take a can, a jar, or a package and take it easy—every recipe on these pages is easy as a summer breeze."

Since January, 1954, some 96 published magazine articles have given canned foods a major role. The total consumer audience represented comes to more than 200,000,000; and this tabulation does not include any editorial features devoted to single products.

(2) Begin a continuing consumer relations program to strengthen appreciation of canned foods' economy, nutrition, variety, time-saving, safety, availability and convenience—While national magazine articles provide the most dramatic illustrations of support for canned foods in consumer media, materials on canned foods and the canning industry prepared as part of the N.C.A. consumer relations program are distributed to food specialists in every medium of mass communications. Special newspaper releases, radio scripts and television program outlines are prepared on a continuing basis. Among the outstanding examples of the kind of materials which stress all of canned foods' basic attributes are:

"The ABC's of Canned Foods," first comprehensive reference book on the canning industry and its many products. This book has been sent to nearly 700 food specialists in the newspaper and magazine field, radio and television, company home economists, advertising agencies, government extension workers, and others.

"The Three Squares," 13-minute color movie now in production. The film emphasizes the canning industry's prestige and the valuable contribution canned foods make to modern living. It will be shown on television and will be available for clubs and similar groups. The film has the endorsement of the USDA.

A recorded interview between Secretary of Agriculture Ezra Taft Benson and Carlos Campbell on the subject of how the canning industry helps feed our rapidly expanding population. The great success of two versions of this interview—one for women's programs and one for farm programs—has led us to plan a series of recorded interviews for radio use in the coming year.

Participation with other food industry associations and individual companies in special publicity events such as last August's silver jubilee celebration of the supermarket industry. Such events lend a timeliness to editorial features about the canning industry and bring canned foods into proper focus as a leading segment of the food industry.

A specific, continuing publicity program in both the consumer and the trade fields—as well as in farm papers and other special interest publications—is being built around N.C.A.'s Farm Youth Program. N.C.A. is supporting a canning crops project sponsored by the National Junior Vegetable Growers Association, and our cooperation with N.J.V.G.A. makes it possible to plan local, state and national publicity on this project.

(3) Create the national canned foods conference as part of the 1955 N.C.A. convention program—In 1955, editorial interest in the N.C.A. program and canned foods in general reached a high pitch. Editors of national magazines, Sunday supplements and leading newspapers were devoting a tremendous amount of space to the canned foods industry—so much that we felt a conference last year would do little to achieve further editorial attention. We had almost reached a saturation point.

This year, however, we feel it is time to stimulate new editorial excitement about our industry and its products with a food editors' conference. We are therefore, conducting a one-day meeting for 75 editors invited - 47 attended.

The editors have toured Convention Hall, been entertained at luncheon with the Board of Directors, and will attend an afternoon press conference at which N.C.A. staff members will bring them up to date on the latest developments in the industry. The afternoon conference will be followed by a reception given by Mr. Campbell, and after dinner they will convey back to New York and Philadelphia by chartered buses.

Editors like to be kept up to date, and they like to get acquainted with the people who make up an industry. We feel that this conference is giving them a fresh understanding of the modern techniques and new trends in the industry and will increase their appreciation of the industry's products.

(4) Appoint an operations committee from the trade—Such a committee was appointed early in 1954 and has been providing counsel and guidance in the area of trade relations ever since. Its help has been particularly valuable in the planning and execution of long-range activities such as the Philadelphia Project and the Cost of Handling Study.

Members of the Operations Committee are: Paul Willis, Grocery Manufacturers of America; Watson Rogers, National Food Brokers Association; E. Norton Reusswig, Lestrade Bros.; Virgil Stewart, Food Brokers, Inc.; William L. Stickney, Jr., Plee-Zing Inc.; Ralph Johnson, National-American Wholesale Grocers' Association Inc.; Harold O. Smith, United States Wholesale Grocers Association; John Logan, National Association of Food Chains; Don Parsons, Super Market Institute; Marie Kiefer, National Association of Retail Grocers; Jerry Young, National Retailer-Owned Grocers Cooperative; and Ray O. Harb, Red and White Corporation.

(5) Activate a national marketing research organization to obtain accurate information from the trade—Don White, Inc., a New York marketing research organization, was chosen to provide N.C.A. with a scouting force of field men who, for two years, have been periodically checking the retail trade, reporting trends in food merchandising in general and in canned foods selling and promotion.

Material provided by Don White has served as the basis for N.C.A.'s monthly Trade Information Bulletin. Don White has also completed a num-

ber of individual studies on such subjects as canned foods' cost of handling, retailer attitudes about canned foods' profitability, advertising and point of sale display of canned foods, and sales increases resulting from specific promotional tie ins.

Keeping in close touch with the retailer continues to be an important activity for the canning industry.

(6) Prepare a merchandising manual based on research and on counsel of the operations committee—The Operations Committee advised to prepare a series of individual bulletins and other materials which would discuss specific projects or problems. It was felt that such an approach would make the information much more practical for canners to use.

As a result, we have attempted to prepare for N.C.A. members periodic bulletins dealing with merchandising possibilities for individual projects in the Consumer and Trade Relations Program.

In addition, we have planned merchandising events such as the panel discussion on last year's convention program. The subject was "Can The Smaller Canner Merchandise?", with panelists including some of the leading food merchandisng experts in the country.

This year's N.C.A. convention program will include a panel discussion on canned foods' contribution to the retail store. The program will be moderated by Mrs. Marie Kiefer, Secretary-Manager of the National Association of Retail Grocers, and will include outstanding progressive independent retailers. The panel will cover such specific subjects as canned foods' contribution to net profit, canned foods' importance as a traffic and sales builder, the in-store promotion and advertising of canned foods, and an estimate of the costs of handling and selling canned foods. The canner-retailer partnership and how it should work will also be discussed.

(7) Arm N.C.A. members' sales representatives and brokers with other merchandising materials—A variety of materials has been prepared for N.C.A. members, all with a view to providing more sales ammunition for the individual canner to use in his calls on the trade. A variety of approaches to this problem has also been tried.

Since the canning industry is composed of individual members with individual marketing patterns and problems, we feel that a variety of approaches to the subject of merchandising will always be of more value to the industry than any one approach could ever be.

Among individual merchandising materials which have been distributed to N.C.A. membership through the Consumer and Trade Relations Program are:

Sales Builder Kit—containing samples of early editorial materials and suggestions of ways members could use them in contacts with brokers and customers.

Reprint mailings of editorial features in national magazines with bulletins suggesting possibilities for using them.

Do-it-yourself Sales Builders—four-page leaflets suggesting retail display tie-in ideas to capitalize on editorial articles in magazines.

Cost of Handling film—a movie report of Don White's study has been shown at state canners association meetings this fall and is available for the use of members in their own sales meetings.

Retail Field Reports—only one of this series has been released, the one distributed at meetings where the Cost of Handling film has been shown. The entire series will be sent to members, each report to deal with a single point revealed by the cost of handling study.

Among future plans for producing merchandising aids is a series of short films on the general subject of how to promote and sell canned foods.

(8) Inaugurate a continuing prestige publicity program in the trade press—Both the canning and the grocery trade press are informed through meetings, publicity releases and photos of all significant projects which comprise the Consumer and Trade Relations program.

The latest conference of trade press editors was held for the purpose of showing the movie in which results of the Cost of Handling study were outlined by Don White. The trade papers will receive a series of articles on the results of this study.

They will also receive within the next few weeks a series of releases dealing with findings from another trade study undertaken by Don White Inc. This was a check of sales of five canned food product categories—fruit cocktail, tomato juice, crushed pineapple, pork and beans and beef stew—in five supermarket organizations which tied in with *Better Living* magazine's "Cook It The New Way" promotion in cooperation with *Better Living* and N.C.A. Results show that promoting one brand of a category increases sales not only for that brand but for the category as a whole.

Success stories such as these and reports of survey results and consumer promotion projects are all significant in helping build prestige for the canning industry among food retailers.

(9) Set up guidepost trade studies to improve retailer attitudes toward canned foods—The Philadelphia Project, in which American Stores Co. is cooperating with N.C.A. in experiments in canned foods merchandising and selling, will provide the canning industry with a comprehensive study of canned foods handling at the retail level.

Basic information on canned food sales is being collected, with sales of 750 items measured by unit, by brand and by product group. Sales are being measured against the sales of other departments in the store, against sales per visible foot of other items, against traffic, against all grocery sales, and against average dollar sales per customer.

Corollary investigations are in progress on such subjects as evaluation of vertical shelf location, lighting of displays, multiple packaging and types of displays and display locations.

The Philadelphia Project will be completed at the end of 1957. At that time N.C.A. will have a wealth of material which will be of tremendous interest to the retail trade. And prior to that we will have results of specific projects conducted within the framework of the Philadelphia Project which will provide information on specific subjects such as those mentioned above.

(10) Start a nationwide net profit retail trade study—on the advice of the Operations Committee, the study originally planned as an investigation of net profitability of canned foods was changed to a study of handling costs and other factors involved in net profit. In other words, the study stopped short of investigating net profit itself, since the Operations Committee felt that net profit is a subject many retailers are reluctant to discuss.

The Canned Foods Handling Costs study was completed and analyzed last summer, has been made into a filmed report and shown at many fall meetings of state canners associations, will be reported to canners in the form of a series of Retail Field Reports, will be made available to the trade press, will be used by canning industry suppliers in trade advertising, and will be reported at several food trade association conventions.

(11) Establish a speakers' bureau and arrange for appearances at national and regional food industry meetings—This project has been handled informally, rather than through a formal speakers' bureau.

The Canned Foods Handling Costs study offers the first significant topic for discussion at such meetings. It was presented at the National Food Brokers Association meeting here by E. A. Meyer, of Richmond-Chase, who represented N.C.A. on the brokers' program.

It will be presented by Don White at the spring meeting of the U. S. Wholesale Grocers Association and at Red & White's annual convention. A program spot for Mr. White is still being considered by several other groups, among them National-American Wholesale Grocers and I.G.A.

The handling costs study report will be made via film for state and local retail grocers' associations, and a special version of the film will have an introduction by Mrs. Marie Kiefer, Secretary-Manager of the National Association of Retail Grocers.

All food trade associations have been offered the opportunity of having a speaker discuss some aspect of canned food merchandising and selling at their convention meeting. The response indicates that they are interested in our market research projects and that both the handling cost study and the Philadelphia Project provide material of interest to them for future programs.

(12) Form key retail outlet sales training groups—This step has not yet been taken, primarily because it seems premature to inaugurate such an activity without the information which will be available when the Philadelphia Project is completed. Information which will provide sound material for sales training is now being accumulated in the Acme stores laboratory.

Sales training for personnel in key retail outlets is a sound plan and a project which we feel should be considered after the Philadelphia Project is completed and the findings analyzed.

(13) Prepare and distribute trade information to N.C.A. members—To date, 20 monthly issues of the Trade Information Bulletin have been distributed to N.C.A. members. The value of the material in these bulletins is indicated by the fact that nearly every month members request that new names be added to the list of those receiving the bulletin. Many items are picked up by the trade press, and very often special mailings of items are made by the industry.

The bulletin will be continued, and will include wherever possible the results of original marketing research projects undertaken by N.C.A. as well as a review of pertinent material published by the trade press, case histories, etc.

(14) Produce and distribute regularly scheduled newsletter to the entire retail food field—At the beginning of the N.C.A. Consumer and Trade Relations Program, a meeting was held with representatives of other interested groups within the industry. At that time it was agreed by everyone that the canning industry would be best served if each group attempted to supplement, rather than duplicate, what was being done by another. This procedure has worked out just as well as was anticipated, and the interested groups are still working together to do the best total job for the industry.

One of the jobs assumed by a supplier company was a monthly direct mail letter on canned foods merchandising; the letter goes to nearly 100,000 retailers. This digest is excellently written and edited; for N.C.A. to try to do a similar job seems a waste of money.

Conclusion

You will notice that this report refers constantly to projects which are still under way and that many activities have both long-range and short-range advantages for the canning industry.

Currently, there is intense and growing competition among industry groups in the food field for the attention of both consumers and the trade.

Fortunately, the C & TR Program effects are not only immediate but cumulative, and the canning industry is in the preferred position of established leadership.

A Wave of the Future

By H. Thomas Austern,
Chief Counsel,
National Canners Association

This has not been the usual dull, grim, and ponderous Convention luncheon. Today a new and delightfully different note has been added. Adorning each table we find a bevy of ladies, some in extremely smart and fantastic headgear, but each a truly stimulating and sparkling table companion.

As you may have already discovered, they are the food editors, the broadcasters, and the telecasters, who contribute so vastly to making our American diet a delight to the eye, a joy to the palate, and no real drain on the pocketbook.

It is my happy assignment to welcome these ladies, to confirm their vital role not merely for the food industry but also for the nation, and to attempt to provide for them some small background for what we know will be an arduous, yet we hope will be an illuminating and perhaps even a diverting afternoon session.

They are to endure, I am told, learned talks on production, marketing, and consumption; to absorb new developments in scientific research; and even to be exposed to the possible effects of atomic blasts on the home pantry.

I approach the pleasant task of greeting these ladies with great timidity. For in my small and always inept experience with women, I have spent most of my time listening, not talking. Nor is there any guidance to be found in the lawbooks. The legal rule, of course, is that husband and wife are one—but never make any mistake as to which one it is.

So in venturing to talk about our able lady guests, I am somewhat in the position of the young husband who asked his wife whether she was impressed with the explanations he gave her about banking and economics: "Yes, darling," she said, "it seems wonderful that anybody could know as much as you do about money without having any."

It is also clear that this Board of Directors has indeed come a long way. Of course we have recently been quite proud to have ladies on this Board. Yet if you went back to the early days of this industry—when the science of home economics was unknown, and all that we knew about the consumer was what the trade told us—the typical canner's attitude was probably expressed in what the poet Thomas Moore once wrote:

"Ask a woman's advice, and, whate'er she advise,
"Do the very reverse and you're sure to be wise."

Today all that has changed. We welcome our lady guests because we know that their advice is needed, their counsel sagacious, their skills important, and that in striking measure the future lies in the hands of these food editors, broadcasters, and telecasters who give program content to these important media of public education.

This noon I should like to deal briefly with one aspect of their varied and important activities. To approach it we can best go roundabout.

Over the years you have constantly been told about the amazing and accelerating increase in our American population. The tentative forecasts of only a few years ago are now becoming widely accepted—that our present population of 167 million will be 178 million in but five years—190 million in 10 years—and more than 220 million in two decades.

In 1955 the baby boom continued. Birth rates were at a record high, and once again there were over 4 million new babies during the calendar year.

More and more the many facets of this population growth are being analyzed.

Let's look at a few of them. At the present time there are about 20 million women working on paid jobs outside the household.

More married women are working than ever before. Indeed, almost one-third of all the married women in the nation have jobs. That is twice as many as in 1940.

As a statistical side-note—for every 100 women of marriageable age there are now 109 single men—more than enough to go around with some bachelors left over. It is also reported that the best husband-hunting can be found on the farms where there are now 152

single men for every 100 available women.

One could spend hours, if not days, highlighting these population figures and their future business effects. A population growth of more than 54 million or 32 percent—during the next 20 years will bring vast opportunities and many troublesome problems.

It will require more houses, refrigerators, furniture, rugs, and television sets—more automobiles and highways—and the creation of millions of more jobs. Indeed, the gross national product is expected to expand to almost double in 20 years, and will reach $770 billion or more annually.

Of course, food consumption will increase, and new consumer markets will develop. Any canner whose business does not grow in pace with the population index will in reality be losing ground. Any periodical whose circulation does not comparably increase will be dormant. There will be tens of millions more to be reached by television and radio.

But the key interest in this population problem has come to center on what the booming birth rate has already done to our schools, and, more importantly, on what it will do to them during the next decade or two. Recently, the Fund for the Advancement of Education made a study that dramatically exposes the magnitude of that problem.

Within 10 years there will be 6,600,000 more children in elementary schools—some 28 percent more than there are today. There will be also over 4 million more high school students—an increase of 55 percent. There will be more than a million additional college students.

Move that picture forward another decade to 1975, when the babies born during the boom of the last few years in turn will begin to have children of their own, and the surging demand for schooling will soon thereafter become possibly the most vital of all national problems. For the next 10 years, however, the situation is critical enough. About 600,000 more classrooms alone will be needed to house our pupils.

Yet the most insoluble question is where to get the teachers that will be needed.

As you know, we are losing teachers today at a great rate—by marriage, through retirement, and mostly to higher paid jobs in business. Replacements are hard to get, particularly in the science field. Why should a college graduate with science training enter teaching at $3,000 a year when he can start work with any chemical company at $6,000?

The dearth of qualified teachers equipped to teach science is seriously worrying the Atomic Energy Commission, the National Science Foundation, many in industry, and most officials in the Defense Department. What we are up against is perhaps shown by the young school teacher who, underpaid and with no training in sciences, was once asked by a bright boy to tell him what a vacuum was.

"Johnny," she said, "it's mighty hard exactly to define a vacuum. I can't rightly put it in words—even though I've got it in my head."

The number of teachers needed for the next 10 years seems impossible to achieve. Two million more will be needed to handle the tidal wave of new students, and to replace those teachers who quit or retire. That means somehow getting between now and 1965 about 16 new teachers for every 10 teachers now on the job.

It would mean that more than half of all of the college graduates over the next 10 years would have to enter

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teaching—leaving very few for industry, for research, or for defense.

Obviously, that is an impossible goal. What can be done about it? Three avenues seem to be open.

In the first place, the prestige and status of teachers will have to be improved, their salaries raised, and the techniques of teaching fundamentally modified.

To be freed for teaching, the teacher must be rid of her or his clerical work, time-consuming administrative detail, and the housekeeping involved in running a school. Just as lawyers use law clerks, architects use draftsmen, and trained nurses are widely assisted by nurses' aides, the teacher will have to be given a staff of assistants.

They will call the roll, open the windows, worry about school lunches, supervise play, correct homework, write on the blackboard, and read books to classes. The real teacher will spend her time teaching—perhaps going from classroom to classroom.

There are even plans for teacherless classes with closed television circuits permitting one teacher simultaneously to lecture to several classes.

As a second partial remedy, it is said that a large number of educated adults will have to become part-time teachers. Engineers may have to spend an hour or two each week teaching physics in our high schools, architects in teaching mechanical drawing. Chemists may have to devote some daytime hours to teaching elementary chemistry. Musically talented mothers will undertake to teach music and group singing.

Businessmen in every community may also have to volunteer to teach mathematics. Some have wondered how many canners would qualify as teachers of elementary arithmetic, let alone cost accounting.

Lastly, and probably most important, education will become more and more dependent upon the great public media of communication—the printed word, the radio broadcast, and the television program.

That new dependence will not only answer the inescapable need for reliance on these media of communication, but it will also be responsive to the growing feeling that the pupils of tomorrow will have to learn more for themselves by reading, by listening, and by observing.

It is here that these ladies, whom we are privileged to have as our guests, will fill even a greater role than they do today. The basic task of selecting the available information, collating it, editing it, and presenting it in varied form through public media will become increasingly important.

It is not unlikely that in the field of home economics, what used to be called domestic science teaching, reliance upon current magazines, radio discussions, and television broadcasting will be even more vitally needed to maintain desired educational levels.

Most of our special guests today qualify as home economists. In case you have forgotten, a good home economist was once defined as a woman who is one-third Grace Kelly, one-third Dale Carnegie, and one-third pack horse to carry the materials she has to use.

But, fundamentally, these ladies have mastered the art of communication, which is the essence of teaching. In the food field they do a superb job.

They do it by writing in a lucid, dramatic, and truly informative fashion. Mr. Justice Holmes once said that a word is only the skin of a living thought. For them every word is vapid if it does not carry a concrete, meaningful message.

They do it also in illustration—in vivid pictures, both still and moving.

If the Chinese proverb is right that a good picture is worth 10,000 words, these ladies might all be appropriately dressed in Mandarin blouses and hats.

Above all, these home economists, editors, broadcasters, and telecasters work with ideas. The mental menus they devise offer sustenance for everyone—man, woman, and child.

Joseph Conrad once observed that being a woman was a terribly difficult task, since it consisted principally in dealing with men. I am told that these ladies excel in that area, as anyone who has ever argued with them about a budget is likely to know.

Even more, they know the pathways through that *terra incognito* for most men—that unknown land for all males—the intuitive mind of a woman.

But their special skill, to which their daily work contributes, is most significant in this field of needed education of young people. Here their training and capacities, their open-mindedness to new ideas, and their aptitude for communicating them through the varied media in which they work, inevitably makes them splendid teachers in the broadest sense of that term. This happy combination offers perhaps the brightest ray of hope in the educational void which is opening before the country.

Hence I venture to repeat that whatever may be their valued contributions to the food industry, their social importance to the country as a whole must never be forgotten.

Perhaps this is because in their work they always start with the facts. Given the facts, these ladies have the genius for organization, for illustration, and for effective presentation. If in the future, as I have suggested, much of what a young man and a young woman can learn—either in school or later on—will turn on what he or she reads, hears, and sees in these public media of communication, only these ladies and those they train can insure that this necessary supplementary education will be sound and effective.

For these reasons, among others, the Association is delighted to welcome them today.

It has always been the policy of the National Canners Association that its job was through research to learn the facts, and make them available to those who were interested and could effectively utilize them.

Both the Board members and our guests have come to learn that the Consumer Service Division of the Association is operated on that theory—on the basis that factual material that was accurate, complete, honest, and at the same time good reading would commend *itself*—that education and not propaganda was its cardinal job.

As the activities of these food editors, food broadcasters, and telecasters expand—as I am certain they must as part of the needed educational process—each of them can, I am sure, have continued confidence that for canned foods the National Canners Association will keep them fully informed, up to date, and always alert to all new developments.

Yet in doing so, the Association will not only be effectively serving the canning industry. Nor will it alone be assisting these ladies in their important work. Together, they shall also be serving the cause of education and democracy.

More than 150 years ago James Madison insisted that "popular government without popular education is a prologue to either a farce or a tragedy." Today, as one looks around the world at Iron Curtains that darken not only countries but men's minds, he is reminded also of what H. G. Wells once said: "Human history becomes more and more a race between education and catastrophy." In that spirit which, however friendly, remains inescapably serious, we hope that our guests will enjoy the program organized for them, as much as all of us have enjoyed having them with us this noon.

Minnesota Canners Promotion

A report on successful staging by a State Canners Association of a promotion opportunity made possible thru the N.C.A. Consumer and Trade Relations program was presented at the annual dinner for the Association of Canners State and Regional Secretaries, given by Executive Secretary Carlos Campbell, January 19.

The case history was the joint tie-in project of the Minnesota Canners & Freezers Association with *Seventeen* magazine. Don Callahan of the Dudley-Anderson-Yutzy organization described the program, and distributed a special illustrated publication entitled "The Story of a Canned Foods Promotion—How a National Editorial Event Became a Local Success Story."

The booklet and the report described how the promotion was developed from a double-page spread in the magazine which featured 29 canned products. *Seventeen's* interest was in a community-centered nutrition education project, and the N.C.A. and the magazine agreed that a statewide test of a manufacturer-store-school program would be a valuable experiment for canners, educators and the magazine.

"*Seventeen* felt that Minnesota would be an appropriate state in which to conduct the test because of its progressive school system and central location. N.C.A. felt that the Minnesota canning industry was strong and well organized and would be interested in such a project. The Minnesota Association's Public Relations Committee voted to participate and from then on Minnesota canners worked directly with retailers and schools within the state," the report states.

The balance of the publication depicts the various steps taken by canners, educators, and merchants in a joint cooperative drive. At the State Secretary's dinner, Edwin C. Kraus, chairman of the Minnesota publicity group, and Edwin W. Elmer, secretary of the Association, supplied specific details about the campaign.

N.C.A. Publicity Activities at the Convention

A Press Room was maintained by the staff of the Information Division of the N.C.A. on the Sundeck, Hotel Traymore, throughout the Convention for the use of some 100 newspaper, magazine, radio and TV representatives covering the event.

Copies of the 50 Convention speeches, summaries, and statements were available there, along with 12 special news releases written and issued during the proceedings and five advances. Photos and biographies of speakers and officers were issued also, and the Information staff assisted reporters with background information and in other ways. Much of this appeared in daily newspaper accounts and features in Atlantic City, Philadelphia, New York, and elsewhere, as well as on radio and TV newscasts. Special mailings were made also to more than 140 publications throughout the country.

Radio Interviews

Both Secretary Carlos Campbell and Farm Youth winner William Rockefeller were interviewed for separate programs by The McCann's of New York Station WOR.

Morrill Addresses Exchange Club

President George B. Morrill, Jr., was guest speaker at a meeting of the Atlantic City Exchange Club on January 18. He presented the color slides and comment on the nuclear tests of canned foods of last May.

Program on Monitor

Secretary Benson's presentation of the N.C.A. plaque to the Farm Youth winner went out live on NBC's Monitor network being broadcast directly from the stage of the American Room during the Closing General Session with Monitor camera and sound men engineering the broadcast.

Benson Press Conference

A special press conference was held for Secretary Benson in Secretary Campbell's suite right after his appearance on the program. This was televised for Telenews. Also, the Secretary and winner Rockefeller were televised together.

FOOD EDITORS CONFERENCE

PRESIDING: Katherine R. Smith, Director, Consumer Service Division, N. C. A.

ADDRESS: "Production, Marketing, and Consumption Trends in Canned Foods"—Howard L. Stier, Director, Division of Statistics, N.C.A.

ADDRESS: "Some Developments in Raw Products Research"—C. H. Mahoney, Director, Raw Products Research Bureau, N. C. A.

INTRODUCTION of Contest Winner, Farm Youth Program, N.C.A.-N.J.V.G.A.

REMARKS by William Rockefeller, Phelps, N. Y., Contest Winner

ADDRESS: "New Developments in Scientific Research"—C. A. Greenleaf, Associate Director, Washington Research Laboratory, N.C.A.

ADDRESS: "Those Blasted Canned Foods"—Nelson H. Budd, Director, Information Division, N.C.A.

SUMMARY REMARKS by Fred C. Heinz, H. J. Heinz Co., Pittsburgh

Introductory Remarks

By Katherine R. Smith, Director
N.C.A. Consumer Service Division

Food editors, telecasters, and broadcasters—you were officially welcomed at luncheon, but again we want to tell you how very glad we are that you are spending the day with us. There are a great many new developments in the canning industry beginning with the growing crops, and taking place in every step thereafter, until the food is on the grocers' shelf in cans and jars ready to go to the home kitchen. We have looked forward to this day when we could share the latest news about canned foods with you.

I suppose that every industry takes pride in the place its products hold in its field. We in the canning industry are particularly proud that our products hold such an important place in the American diet. Your public and our customers show their approval of canned foods in the quantities they use. Here are a few examples: About two-thirds of the peas are eaten in canned form, and the remainder in fresh, frozen or dried form; two-thirds of the sweet corn, three-fourths of the tomatoes (including tomato products), three-fourths of the beets, and one-half of the asparagus canned. Large quantities of fruits also reach consumers in cans and jars. Most of the pineapple, well over one-half of the sour red cherries, 45 to 50 percent of the peaches, pears and apricots, and a large volume of apples and citrus fruits come to the table from cans and jars.

KATHERINE R. SMITH

One of the penalties for widespread popularity, however, is the danger of being taken for granted. One example is the convenience factor. We hear a great deal these days about convenience foods. Our industry states modestly that we were way out front early with built-in convenience. Nutrition-wise and quality-wise we have come a long way, and we are still on the march. The speakers today will bring you the story in more detail and with specific examples.

You will see on your programs that the very important subject of food preparation is not listed. We are well aware that unless the food is prepared and served by good methods, much of the care taken in producing quality foods is lost. You, our guests, are experts in presenting foods with appetite appeal, or as we sometimes say, handling the food with loving hands. We have seen much evidence of the excellent ways in which you spotlight canned foods in practical and tempting ways. And so we omit from this afternoon's program the preparation of the food for the table, and leave that subject in your capable hands.

Production, Marketing, and Consumption Trends in Canned Foods

By Dr. H. L. Stier, Director, Division of Statistics, National Canners Association

The slogan "Canned Foods for Modern Living" has in reality become a truism of 20th century Americana. During 1955, Americans opened and used each *day* an average of approximately 100 million containers (tin and glass) of canned foods of all kinds. One of the largest and most popular groups of canned foods is fruits and vegetables which account for about one-third of this figure.

Record quantities of fruits have been canned in recent years (Figure 1). In 1954 the 1.7 million tons of deciduous fruits canned represented one-fifth of the total U.S. production of all deciduous fruits (Figure 2). The 1955 tonnage is expected to exceed this figure by almost 10 percent and thus establish another record. The proportion of the total production of the major fruits being canned is continuing upward. In 1954 (the latest data available) 58 percent of all the apricots were canned; 52 percent of the pears; half of the red cherries; 39 percent of the peaches; and 18 percent of the apples (Figure 3). It is estimated that canners paid fruit growers over $140 million in 1955 for the deciduous fruits they canned. Citrus growers received an additional $40 million from canners.

The tonnage of vegetables canned is almost four times that for fruits. During the past five years an average of 6.4 million tons of vegetables were processed. Farmers received over $252 million in 1955 for the vegetables sold to processors. Forty-five states produce vegetables for processing. Wisconsin leads all other states in the acreage of vegetables for processing with a 10-year (1944-53) average of 277,380 acres. Other important states are California with 194,890 acres; Minnesota, 131,930 acres; New York, 111,070 acres; Indiana, 107,480 acres; and Maryland, 102,270 acres.

A relatively high percentage of the total production of the major vegetable crops is canned. About three-fourths of all the tomatoes are canned, 70 percent of the peas, 60 percent of the sweet corn, and about 40 percent of the green beans. In recent years sweet corn has replaced peas as the largest volume canned vegetable item and the pack of canned green beans has shown spectacular growth and is challenging tomatoes for the number three spot. The pack of green beans averaged 7.3 million cases, basis 24/2's, during the prewar period 1935-39, compared with over 18.0 million cases during the past five years. The total tonnage of tomatoes going into canned tomato products has increased 80 percent since the prewar period. The 1955 pack of peas was 38 percent above the prewar average, and the pack of canned sweet corn has averaged during the past five years about 60 percent above prewar. The trend in the production of seven major categories of canned foods from 1938 through 1955 is shown in Table 1.

The annual sales of the canned foods represented by the seven categories in Table 1 have a retail value of about $4 billion.

Since the end of World War II there has been a shift to smaller can sizes. This increased popularity had been most marked in the No. 303 or 1-pound can and the 8-ounce can. About one-half of all the canned vegetables are now packed in the No. 303 can (Figure 4) and more than one-fourth of the fruits (Figure 5). This compares with about 20 percent of the vegetables and 12 percent of the fruits in the 303 can about six years ago. The largest proportion of 303 cans are used in the packs of peas and corn. About three-fourths of the peas and

FIGURE 1

TREND IN UTILIZATION OF DECIDUOUS FRUITS USED FOR CANNING, 1945-54

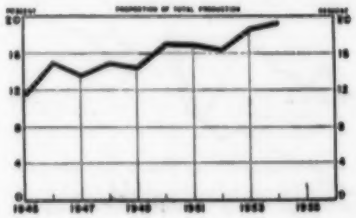


FIGURE 2

TONNAGE OF DECIDUOUS FRUITS USED FOR CANNING, 1947-54

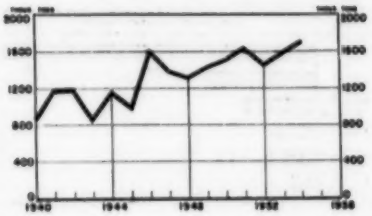


FIGURE 3

TREND IN UTILIZATION OF SELECTED FRUITS FOR CANNING, 1945-54

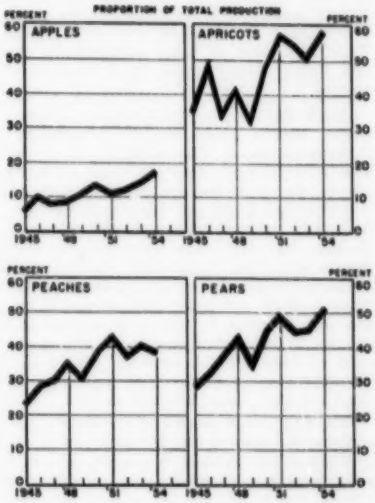


TABLE 1

TRENDS IN PRODUCTION OF CANNED FOODS, 1938-1955

Year	Fruits	Juices	Vegetables	Specialties	Milk	Fish	Meat	Total
			(millions of standard cases)					
1938	40	39	122	67	49	17	7	341
1939	52	43	108	74	51	19	9	356
1940	49	55	133	79	58	19	12	405
1941	62	59	163	92	77	23	20	496
1942	59	73	194	54	83	18	43	524
1943	47	79	179	53	73	17	46	494
1944	57	95	170	69	82	18	43	534
1945	52	111	177	83	90	19	43	575
1946	83	105	201	102	74	21	30	616
1947	68	98	166	104	77	22	24	559
1948	66	94	158	111	81	24	24	558
1949	71	91	164	112	66	26	23	553
1950	77	109	166	113	68	30	27	590
1951	83	104	209	118	67	25	33	639
1952	77	109	194	120	66	26	30	622
1953	80	114	189	127	60	26	32	628
1954	83	100	183	125	59	28	32	610
1955*	92	93	190	130	60	24	33	622

* Preliminary.

FIGURE 4

CANNED VEGETABLES: PROPORTION OF PACK IN MAJOR CONTAINER SIZES

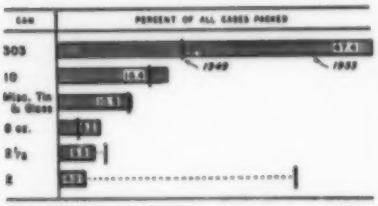


FIGURE 5

CANNED FRUITS: PROPORTION OF PACK IN MAJOR CONTAINER SIZES

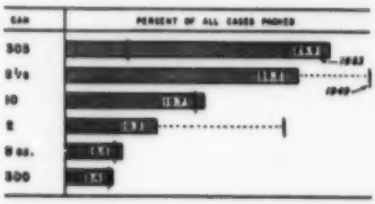
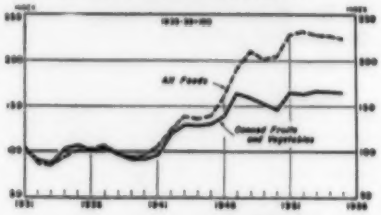


FIGURE 6

CONSUMER PRICES OF CANNED FRUITS AND VEGETABLES, 1931-55



about two-thirds of the sweet corn are now canned in the 303 can. About 6 percent of all canned vegetables are now packed in the 8-ounce can compared to 3 percent five years ago. The proportion of the fruits and vegetables packed in the No. 10 can has been fairly stable (15 to 20 percent) with a tendency to increase in recent years. This can size is used principally by the institutional trade and the armed forces.

Such factors as convenience, sometimes called "built-in maid service," improved flavor and quality, and the great variety of selection have all been important in bringing about the great popularity of canned foods. However, probably one of the most important factors has been the relatively stable price and the constant "best buy" status of canned foods among all other foods. Today the consumer price index for canned fruits and vegetables at the retail level is about 165 percent of the 1935-39 average while for all foods it is about 225 percent of this prewar base (Figure 6).

The price per pound of a given commodity in canned form is very often less than the price for the same commodity in non-canned form. The consumer price index of canned fruits and vegetables on the 1947-49 base stands today at about 105 percent compared with 115 for all foods. The average weekly wage today will buy about twice as much canned food as during the prewar period 1935-39. This outstanding record was accomplished by constantly increasing the production efficiency in the canning plant. The output of canned food per man-hour was increased 50 percent in the past decade in the canning industry as a whole. This is a record not matched by many other manufacturing industries. As a result the price of canned foods has not risen as rapidly as other foods although there have been increases of 60 percent in the cost of containers and labor during the past 10 years as well as other significant increases in the cost of machinery, supplies, transportation and raw material.

A number of canned foods today are almost universally used. More than 95 percent of the city families in the U.S. use such canned items as soup and catsup; 90 percent of the city families use canned pineapple; 85 percent use canned peas and tuna; and three-fourths of them use such canned items as fruit cocktail, sweet corn, and baked beans. Even the rural family, which in past years has used relatively little canned food, has now become an important market. Surveys in recent years have shown that a higher percentage of rural families than city families use such canned items as luncheon meat, orange juice, and baked beans.

HOWARD L. STIER

Canned fruits and vegetables are bought by the largest percentage of families in the New England and Pacific states. In the East South Central states a relatively high percentage of the families buy canned meat and canned milk. In the North Central states a very high percentage of families buy certain canned vegetables, especially peas and corn. States in the southeastern U.S. show the lowest percentage of families buying canned foods.

As a general rule canned foods are most popular in families where the housewife is 35 years of age or less. For most items in canned form the frequency of usage decreases as age of the housewife increases. For example, one study showed that of all the families where the age of the housewife was 30 or less 91 percent of them used canned sweet corn while only 77 percent of the families in the group where the housewife was 60 or over used canned corn.

The per capita consumption of canned vegetables is at present 38 percent above the 1935-39 rate, and 36 percent higher for canned fruits (Figures 7 and 8). For the past four years the per capita rate has been about 41 pounds per year for canned vegetables and about 20 pounds for canned fruits. The per capita consumption of canned fruit juices is now about 3½ times the 1935-39 rate. Some of the greatest increases in per capita consumption have occurred during recent years for such items as canned soups, up 145 percent since 1935-39; baby food, up 1608 percent; and canned meats with a per capita consumption 10 pounds, 242 percent above 1935-39.

FIGURE 7

PER CAPITA CONSUMPTION OF CANNED VEGETABLES AND SPECIALTIES, 1945-54
1940-54

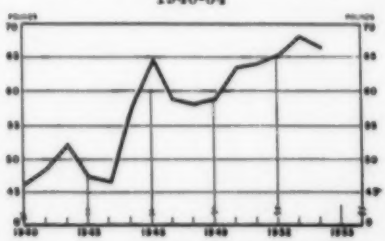
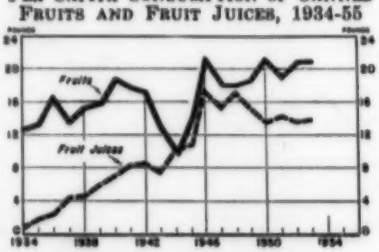


FIGURE 8

PER CAPITA CONSUMPTION OF CANNED FRUITS AND FRUIT JUICES, 1934-55



Some Developments in Raw Products Research

By Dr. C. H. Mahoney, Director, Raw Products Research Bureau, National Canners Association

The newspapers and magazines, as you people know, are full of articles indicating the wide range of research which is under way in this country directed toward extending human life and protecting and preserving it. Television and radio outlets also adapt research data dealing with this subject for their programs so that I am confident the general public is much better informed about these problems than ever before in our history. I am also sure, however, that the general public knows much less about new research developments affecting the life of plants, although we are dependent upon them for maintaining our own lives, and it is about some of the more spectacular of these developments that I wish to talk to you today.

Many of you either have gardens or know people who have them. You, of course, know that plants grow and that they mature, but some of you perhaps do not realize that in the progression from germination to maturity they are subject to some of the same misfortunes that beset human beings. For instance, they have diseases, which among plant groups is known as the science of plant pathology, or phytopathology. The wide use of antibiotics for relief of some diseases affecting people is well known to all of you. Some of these same antibiotics appear to have great promise for the control of certain plant diseases.

One of these is streptomycin, which is being used for control of such diseases as fire blight of apples and pears, bacterial spot on tomatoes, halo blight of beans, and downy mildew on lima beans. The minute organisms causing these diseases enter the plants through wounds or through natural openings of the plant such as the "pores" or stomata on the top and under side of leaves through which the plant receives light and water. If the bacteria finds conditions suited to its needs it will make rapid growth and will enter the sap stream of the plant causing a complete breakdown of certain of the plant's living tissue. Streptomycin, when applied, is absorbed by the plant into the sap stream where it combats the bacteria. In a number of tests made in the laboratory and field, streptomycin appears to hold much promise as a means of treating certain plant diseases, and research is under way in a number of experiment stations and the U. S. Department of Agriculture looking toward an extension of the use of this and other antibiotics to other plant diseases. The scientific journals devoted to publishing articles on plant diseases contain progress reports which have been made by scientists who are studying the possibility of expanding the use of antibiotics to plant-growing problems.

Producers of fruits and vegetables do not depend entirely upon treating the plant after it has become sick; geneticists are carrying on studies directed toward "breeding out" or modifying the tendency of certain plants to develop specific diseases. Through controlled breeding experiments conducted over a long period of time they have been able to develop resistance, and in some cases immunity, to diseases such as verticillium wilt on tomatoes, resistance to western yellow

C. H. MAHONEY

blight on both tomatoes and beans, and fusarium wilt on peas. Briefly stated, this is done by cross-breeding a resistant plant with another susceptible plant which has the quality, color, or size desired. Testing of the progeny for susceptibility or resistance is then carried on over a period of years by artificial inoculation procedures, and only those plants which survive this severe inoculation test are saved for seed reproduction.

Now that we have a healthy plant growing in the field which is either able to withstand disease attack through its own genes or which we can help survive if it is attacked by disease by applying one of the new antibiotics, what other enemies must the producers of plants guard against? We all know that there is constant competition among growing plants of all kinds for light, water, soil nutrients, and space. If these natural resources are severely drawn upon by the weeds which spring up in all growing areas, the plants we wish to produce will suffer through that deprivation. Here again research has indicated a remedy which is being widely used with good results. Certain chemicals known as "herbicides" have been developed which are highly selective in that when they are applied to a growing field they will destroy the weeds and not harm the carrots or beets or whatever crop is being grown. The name of the chemical which should be used to control specific weeds can be learned through contacting the experiment station workers in the local area. New adaptations of these chemicals or their application, or new chemicals themselves, are constantly coming into the picture so that the study of weed control in cultivated crops has become a highly specialized branch of plant production. It is putting far behind us such an expensive practice as hand hoeing to keep down weeds.

We were talking about breeding for disease resistance a few minutes ago. Let's consider a different objective in connection with breeding experiments. You all know about the various gradations that can be brought about in the color green. They range all the way from a delicate shade of apple-green to that of the shade known as forest-green found in firs and pines. You undoubtedly know also that color is an inherited characteristic, just as eye color is in human beings. If a brown-eyed man marries a blue-eyed woman and all the children are brown-eyed, it means that the gene for brown eye is dominant and blue eye the recessive gene. The father just mentioned must have two genes for brown eyes as all the children show the dominant character. If half the children had blue eyes the father would be a "carrier" for blue eyes or he would have one dominant gene for brown and a recessive for blue. Many of the quality characters desired by plant breeders are recessive, and the selective process is "stepped-up" by back-crossing progeny to the recessive parent. However, dark-green berry color in peas is a dominant character and by continued selection of only the dark-green progeny it is possible to obtain a pure-breeding line.

Color of the finished product is one of the most important considerations canners must achieve, and desirable color must be inherent in the raw product. The canner must have a product which will be attractive to the consumer when she opens the can. The seedsmen who sell to canners, and the canners themselves, are steadily carrying on breeding experiments with a view to obtaining desirable color. Work on snap beans, lima beans, beets, peas, and many other vegetables has carried the canning industry a long way from where it was even 20 years ago with respect to color of the finished product.

Coming back to the experience of home gardeners again, we want to grow strains of vegetables in our home

gardens which will provide us with successive crops. We don't want to grow a variety of snap beans or corn which will have only a limited period of production. We want to be able to pick them all during the summer, but whether they mature this week or a week later is of no material importance to us. Our household management, or menu-making, does not revolve around our being able to "pick a mess of beans" one day or the next. On the other hand, the canner must harvest the entire crop of peas, limas, or sweet corn at one time in order to obtain uniform quality, and he must plan carefully for the most economical use of labor and equipment to maintain an adequate and steady flow of raw materials from the field to the factory. To achieve this he must have precise information on when to plant the crop so that when it is harvested it will be just at the proper stage of maturity, and not beyond that point.

Those who have studied the factors affecting plant growth recognize that temperature, sunlight, available moisture, fertility level, organic content of the soil, varietal differences, topography, exposure, altitude, latitude, frost, drought, etc. are involved. As a tool to help measure maturity, canners are making wide use of a technique known as the "heat summation" or heat unit method. Briefly, the heat unit theory is based on the premise that if a growing plant has adequate moisture and nutrients available in the soil, then temperature becomes the most important factor affecting its rate of growth. It is known that different species of plants, and varieties or strains within a species, have varying rates of growth which are largely determined by temperature. Thus certain crops, on the average, require a certain number of degree-hours or degree-days from planting to maturity. The term "degree day" is used to designate the number of units of temperature measurement equal to one degree of temperature (above an established base point) above the average temperature for a 24-hour period. By gathering temperature records with the use of recording thermometers, or by other means, it is possible to compute the number of effective heat units over the base temperature accumulated during each 24-hour period. Each day's accumulation is added to the amount recorded on preceding days so that at any time the worker can determine the "degree-day" total for the date in question. The heat unit theory, therefore, removes most of the guessing about when the crop will mature by using a compilation of the accumulated heat units which have occurred in the days from time of planting, instead of the growing time required in days, and it helps to make forecasting the harvesting date of crops more a matter of simple arithmetic than guesswork. It is a definite aid in quality control.

And indeed I think you will perceive from the brief account I have given here of some of the new developments in raw products research that there is a steady progression toward improvement in quality of the raw product itself. The important characteristics of tenderness, taste, flavor, and color are constantly being sought through breeding experiments. The most recent discoveries of chemists are taken advantage of through use of new and more effective materials which will control disease and insect attack; and the possible application of new theories of measurement of quality is not only being carefully studied by those in charge of crop production, but in many cases such theories are being further expanded and developed with the objective of the canning industry specifically in mind. That objective is to produce a high quality canned product on which the consumer knows she can thoroughly depend.

Address

By William Rockefeller,
Contest Winner
Farm Youth Program

I am 16 years of age and a Junior in the Phelps Central School, Phelps, N. Y. I am taking Vocational Agriculture in high school and am President of the Phelps Chapter Future Farmers of America. I am also a member of the 4-H and the Junior Vegetable Growers.

The farm on which I live consists of 430 acres and our major enterprises are canning factory beets, potatoes, grain, hay, and beef cattle. The soil is Ontario Loam, well suited to the production of the crops we are raising. Fifty-seven acres of beets were grown on our farm this year with an average yield of 13.2 tons per acre.

The beets I grew this year were an enterprise grown as part of my Vocation Agriculture Supervised Farming Program at school. I had two acres of potatoes as well as the two acres of beets. I chose these two crops as they are the two main crops grown on our farm. I knew I would gain valuable experience in growing these two crops and I also hoped to make some money. As it turned out, I grew the potatoes for experience only.

To start things off, a written agreement was made with my Dad whereby I was to pay for all seed, fertilizer, weeding, and furnish all possible labor. My father was to furnish any extra labor and the necessary machinery in exchange for my labor on the farm.

The land chosen for the beets was along the Canandaigua Lake outlet which provided water for irrigation.

It was then time for actual work to start on the project. On April 16, 1,800 pounds of 5-10-10 fertilizer and 100 pounds of boron were applied to the 2 acres by a bulk spreader truck before plowing.

The land was plowed on April 20 and on April 27, 1,000 pounds of salt was applied to the 2 acres of land. The purpose of the salt was to stimulate the beets and to kill some of the weeds.

The land was then harrowed to mix the salt into the soil. The land was harrowed lightly whenever small weeds were observed coming up. The land was harrowed a total of 6 times and rolled down after each harrowing.

The beets were planted on June 24 in 24-inch rows, and approximately 1-inch deep. Twenty pounds of seed was planted to the acre.

I believe that the next operation, which was irrigation, really made the difference between success and failure. I held off planting the beets as long as possible because of dry weather. After the beets were planted, dry weather continued so irrigation was necessary if the seed was to germinate. They were irrigated for the first time on July 3 and the last time on July 14. The beets were usually irrigated twice daily, early in the morning and in the evening, for a total of about 15 times. Approximately ¼-inch of water was applied at each irrigation for a total of 3¾-inches of water. This added moisture helped most of the seed to germinate so that there was an excellent stand. This good stand caused the beets to be small so they brought top money. Small beets brought the most money because the canning factory the beets were sold to prefer small beets in their canning operations.

You are probably wondering by now why the water was applied at frequent intervals over a 12-day period instead of all at once. The answer is this: our soil has a tendency to crust over after a rain or irrigation. The crust is especially severe if the sun comes out hot after the soil receives moisture. The beets cannot get through this crust and the crust usually forms before the beets come up. By irrigating frequently, although in small amounts, the soil was kept soft and the beets had sufficient moisture to germinate and come up. Irrigation was continued until all possible beets had come up.

To control weeds, the beets were cultivated once on July 9 and again on July 29. The beets were also hand weeded on August 1.

On August 11, 200 pounds of ammonium nitrate was applied to the beets with a cyclone seeder mounted on a tractor. I believe that the beets received full benefit of this later in the fall when there was more moisture.

As the beets were not contracted, I had a choice of several canning factories as buyers. They were sold to Greenwood Foods at Waterloo, N. Y. The beets were harvested on November 8 and 9 with a Scott-Viner beet combine. The beets yielded a little over 20 tons to the acre.

Next year I expect to grow 5 or 6 acres of beets and if the weather warrants, will irrigate. After my success this year, my only worry is that Dad may want to use the irrigating outfit all the time himself.

I would like to thank all those who helped me in making this trip and the trip to New Orleans possible. I would like to specifically thank the New York State Canners for providing my transportation to New Orleans and to all of you for my trip here. I would also like to thank you for the gold watch which I received from your organization at the National Junior Vegetable Growers Meeting in New Orleans.

New Developments in Scientific Research

By C. A. Greenleaf,
Associate Director,
Washington Research Laboratory
National Canners Association

C. A. GREENLEAF

Scientific and technical people have a habit, especially when they are talking about research, of starting out with a historical review tracing their subject from its earliest beginnings. This is irksome to anyone who merely wants to learn what is going on right now, and what it means. However, we have to realize that scientific research, if it is anything more than patchwork tinkering, has to have certain aims, and it is part of the story to tell what those aims are. Usually these aims have developed over a period of time, and that is certainly true of research on canned foods.

The aims that we might consider here refer to the three principal attributes that we as consumers look for in canned food.

First, they should be *safe*. Canned foods have an excellent record in that respect, but we need to know, scientifically, what makes them safe and how to keep them that way.

Second, they should be *nutritious*. When a class of foods makes up a substantial part of the national dietary, as canned foods do, we want to know how they stack up nutritionally.

Third, they should have *good utilization characteristics*. That is, they should be appetizing in flavor and appearance, and convenient to use. We could continue the list of details, but these are enough to suggest what we think of as utilization characteristics.

Research on canning methods and canned foods covers a broad range, but in most of it one can see these three aims forming a sort of pattern: safe foods, nutritious foods, foods that are good to eat and convenient to use. With this for background, let us take a look at a few of the recent and current developments in canned foods research. One of them is:

High Temperature-Short Time Processing

High temperature-short time processing is a relative term. It simply means use of higher temperatures and for shorter times than we have been accustomed to in the past. It is not so much a new idea as a logical extension of the principle we have been using all along, namely that higher temperatures sterilize more efficiently than lower ones, and with less of a cooking effect on the food. However, there have been practical difficulties in applying this principle up to the hilt, difficulties in controlling the heat and in applying it uniformly. The newer developments have been in the direction of overcoming these difficulties and where they are applicable they have resulted in some rather striking improvements in product quality.

In the traditional method of processing canned foods, the heat applied to the outside of the container has to find its way as best it can to all parts of the contents. By the time all of the contents have been heated enough for safety, some parts may get more cooking than they need. The problem, then, is one of getting the heat spread around more uniformly. Two methods of doing this are of particular interest.

One method is that of agitating the cans while they are heated. Basically, this isn't new, but one specific application of it is, because it enables cream style corn to get the benefits of high-short processing. Previously this product had been considered too thick to get any benefits from agitating processing, but now, by special preparation and careful control, it is kept from thickening up fully until after it is sterilized.

Another new application of high-short processing, and a very ingenious one, is the aseptic canning process. In this method the food is forced through a continuous high-temperature sterilizer, then through a sterile cooler and into presterilized cans, which are then sealed with sterile lids in an atmosphere of steam. The sealed, cool can emerges ready for labeling and sale. Thus far this method has been used only with fluid or semi-fluid products, but we may yet see it adapted to foods consisting of large solid particles.

Nutritive Values of Canned Foods

Before the vitamin era, nutrition science was a rather humdrum affair. It was in the early 1920's that the general public began to become aware of vitamins as an important nutritional topic. Before that, a good many may have known that citrus juices had something that kept sailors from getting scurvy, but that was about all. Since then, as we know, the public has become more and more conscious of vitamins, and in fact of nearly every aspect of nutrition.

The National Canners Association started in 1922 its investigations of this growing science, and for years conducted research on the vitamins in canned foods, working with Dr. Walter Eddy at Columbia University. Later on, when many of the vitamins had been identified chemically and better assay methods had been worked out, the N.C.A. and Can Manufacturers Institute jointly sponsored a large-scale research program on nutritive values of canned foods, starting in 1942. This has yielded a vast amount of information, published in the scientific literature, in bulletins, and in a book, "Canned Foods in Human Nutrition." These results have established canned foods as excellent sources of the nutrients inherent in each of the respective products, and the distribution that has been made of the results has undoubtedly been a great service to nutritionists and dietitians everywhere. You have undoubtedly received some of this literature, especially the Nutrition Charts mailed out by our Consumer Service Division.

Looking ahead, we know that food technology will change, as research makes it possible, and one of the guiding principles will be to maintain and, where possible, to improve nutritive qualities as new methods are introduced.

Canned Foods in Atomic Warfare

Later in this program some pictures will be presented showing the participation of the canning industry in the atomic explosion test, "Operation Cue," last May. It would not be proper to anticipate here what will be said in explanation of this series of pictures, but in looking at them, one could well keep in mind the three aims that were mentioned at the beginning of this talk. In terms of the atomic test these might be rephrased:

(1) To find out if canned foods were *safe* foods after the blast.

(2) To find out if they had retained their *nutritive value*.

(3) To observe whether they had lost their *utility* through flavor changes or container damage.

It was to find out these things that many supplementary test programs were made part of the general plan for the "Operation Cue" test. These have been going on ever since, and we hope that all the results will soon receive official clearance for release.

Radiation Sterilization

On Saturday morning, January 21, Colonel Jackson of the Quartermaster General's Office will report at one of the N.C.A. Convention meetings on the status of research work that has been going on to develop methods of sterilizing or at least extending the shelf life of foods by exposing them to ionizing radiation instead of heating or freezing them. We have asked Colonel Jackson to give this report because the major part of the research is being done under contracts with his organization.

The idea of preserving foods by an entirely new method, simply by exposing them to invisible rays from atomic fission products or an electrical generator, is a fascinating one, and no wonder it has caught the imagination of science editors and magazine writers. However, the people who are closest to this work tell us that we need not look for any early practical use of this method to do a complete sterilizing job; there are still too many "bugs" to be worked out: off-flavors, texture changes, destruction of nutrients, etc. The most optimistic people believe that application is in sight for extending the storage life of certain perishable foods by a sort of mild pasteurization or surface treatment. This can apparently be done, using amounts of radiation too small to produce marked chemical changes in the food.

The National Canners Association Laboratories have been doing work on radiation sterilization because, of course, it may eventually be important to canners. Our work has been on the destruction of bacteria, because we know that whether radiation or heat is used as a sterilizing agent, the same kinds of bacteria have to be destroyed in order to keep the food from spoiling. We need to know how much radiation is required, just as our present heat processes are based on scientific measurement of the required amount of heat.

This is not by any means a thorough survey of the research work that has been and is going on to widen our knowledge and improve the technology of food preservation. But it does give a few glimpses, and perhaps shows that scientific research is appreciated and used in the food industry just as it is in so many other fields that affect our health and welfare.

Those 'Blasted' Canned Foods

By Nelson H. Budd,
Director, Information Division,
National Canners Association

In every war since Napoleon canned foods have been an important weapon, sustaining lives of military and civilians alike. With today's atomic warfare, a new condition of greater destruction has been created, symbolized by the familiar mushroom cloud. The question arose, would canned foods continue as an important offensive and defensive portion of our armament? Laboratory tests have indicated they would, but a public demonstration under actual conditions of an atomic explosion was needed to confirm this.

Accordingly, the Federal Civil Defense Administration planned such a demonstration on the Test Site of the Atomic Energy Commission in Nevada. They called it "Operation Cue," a big dramatic event to educate the public on what they should and should not do to protect themselves against nuclear warfare. The products of 150 industries that are used by American householders were included, among them foods, and looming largest, because of their past values in previous wars, were canned foods in tin and glass containers.

NELSON H. BUDD

Twenty-five thousand samples, roughly about a railway carload, were assembled for these tests. The 60 products selected represented canned foods of greatest public consumption along with certain products chosen because of texture or color. The samples were contributed as a public service by about 150 members of the National Canners Association and they covered the complete range of sizes of heat processed foods in tin and glass. They came from practically every state in the Union.

The actual atomic explosion test on May 5, 1955, was preceded by a full year of planning by a committee of scientists drawn from the ranks of N.C.A., the Can Manufacturers Institute, and the Glass Container Manufacturers Institute. The preparation of samples for exposure, the placement of the products at the 18 different exposure localities, and the conduct of the checking and testing at blast-time and afterwards was handled by technologists from these organizations acting under the general supervision of Dr. E. P. Laug of the Food and Drug Administration. Our Canned Foods Test Group did this work in radiological safety garb—surgical caps, goggles and aspirator, coveralls, booties and gloves, with all garment openings taped shut to safeguard against pick up of radioactive material or dust.

They set up a half dozen different exposure conditions: on the surface of the desert; cased and uncased samples on shelves and in cabinets, both in kitchens and basements of various kinds of test dwellings and buildings; in underground and aboveground emergency shelters; in mobile trailers; in trenches.

(*Note*—At this point, Mr. Budd presented a series of about 50 color slides. These pictured the before-and-after blast situation in the numerous exposure locations, ranging from nearly a quarter of a mile from the tower

where the bomb exploded to nearly three miles away and including some scenes where fall-out effects were tested. The pictures shown illustrated: several stages of the blast, flash, heat wave, fire, and the formation of the mushroom and the cloud showing what was happening to buildings and food samples; the burying of samples for later tests of radioactivity and effects on nutrient content; how foods were exposed in several types of shelters and dwellings, on shelves, in cabinets, in basements, in house trailers, on the desert floor, under conditions that prevail in retail stores and warehouses; their remarkable resistance to physical effects of the force of the blast, to scorching, to flying missiles, to dislodgment from shelves; their general freedom from radioactivity. The last scene showed "Grandma's Pantry," a special FCDA project to which the Association and its nuclear test team gave a great deal of cooperation.

(In Grandma's Day, she had a cupboard of emergency supplies to care for the family in case they were snowbound for days, or kept by flood, washouts, tornadoes or other disasters from getting to the store. The idea for the Nevada tests was to create a typical modern three-day emergency supply for a family of four. The N.C.A. furnished about 300 cans of food, representing about 30 different products to equip two such pantries. FCDA is now recommending that all households establish a "Grandma's Pantry" to hold an emergency supply for 7 days and canned foods of course are an important element of this supply, as the pictures demonstrated.)

Detailed published reports on the performance of the canned foods samples must await completion by the technical group and clearance by the authorities, but it can be said now that the immediate objectives were satisfactorily accomplished. The FCDA authorities wanted to gain information that would contribute to public protection against potential enemy attack. They wanted to find out what would happen to the foods if an American city should be attacked by nuclear bombs. Could they be used right away? Should we eat the food that was recoverable? Would it be sterile? Would it contain poisonous radioactivity? Would it still be wholesome and nutritious? Where and how is it most advantageous to keep the emergency foods that would be needed when vast populations are shut off from their normal supply sources with their utilities—heat, light, refrigeration, distribution—knocked out of commission for days at a time?

The tests disclosed that when heat-sterilized foods, in both tin and glass containers were found intact at distances of 3,750 feet or more from the blast, they were safe for use by the public. Storage in basements was found preferable to kitchen cabinet storage when there was moderate to severe blast damage to the house. Altogether, canned foods fared better than the structures in which they were housed.

The food in tin containers exposed at 3,750 feet and at greater distances away was undamaged except for perforations from flying bits of shattered glass window panes, and such damage was readily discernible. The force of flying missiles was terrific—glass wood and metal could pierce a steel can. It was found that when denting of cans occurred from dislodgment from the shelves, the food was not adversely affected.

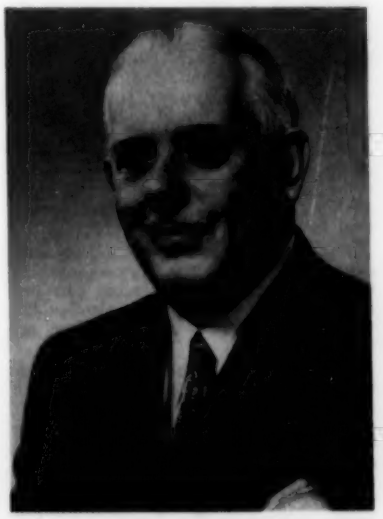
No glass containers showed blast pressure break patterns. Where there were excessive mechanical forces, such as falling masonry as in the shelter at 2,250 feet, there was substantial destruction of both tin and glass containers. In some of the kitchens the shelves experienced a "drum head" movement from the blast which expelled the containers from the shelves to the floor below, and, of course, some glass containers were fractured.

Effect on nutrient content of the exposed canned foods was negligible. Niacin and riboflavin were completely unaffected in many of the products tested and sustained only minor losses in others. There was no loss of carotene in the canned fruits and vegetables tested. Nearly all the products retained more than 80 percent of their thiamine and better than 90 percent of their ascorbic acid. The vitamin content of all the canned products tested was still within the range ordinarily found in commercial production and comparison with the Recommended Daily Allowances for each of the vitamins showed that canned foods normally considered good sources for one or more of these vitamins could still be regarded as good sources after exposure.

Altogether, the tests of the results of an atomic explosion on canned foods in tin and glass should be comforting to the public. They demonstrate that history repeats itself—that canned foods are a safe and protective form of food for use of armed forces or civilian populations under this new type of warfare.

Summary Remarks

By Fred C. Heinz,
H. J. Heinz Co.



FRED C. HEINZ

Good afternoon and welcome.

I think it is appropriate that we should kick off this 49th Annual Convention of the National Canners Association with a meeting of you Food Editors.

We canners are conscious of what you have to say to the millions of people who read your columns. Without you, we would be talking to ourselves. That might be pleasant but not completely productive.

Within the next few days, we are going to hear a lot of words on the subject of growing, processing and marketing foods. These are important subjects. I think you know that the tin can is still a basic accessory in the American kitchen. Canned foods are good, they are economical, they are nutritious and they are getting better all the time. Mrs. America probably realizes this, but she needs constant reminding. We processors are certainly conscious of your influence through your columns in newspapers, magazines and over the radio and television. In spite of the millions of cookbooks that have been sold, some 70 percent of all recipes used in the home come from columns prepared by you food editors. Through you good ladies, our products and their built-in conveniences are made known to the consumer.

We salute you and thank you for coming.

SIRUPS AND SIRUPING OPERATIONS

PRESIDING: Ira I. Somers, Associate Director, Western Branch Laboratory, N.C.A.

ADDRESS: "Sugar Research for Canners"—Dr. Henry Hass, The Sugar Research Foundation, Inc., New York, N. Y.

ADDRESS: "Sirups and Siruping Operations from a Canner's Viewpoint"—Lionel W. Richards, Bercut-Richards Packing Co., Sacramento, Calif.

ADDRESS: "Technical Aspects of Sugar Production and Distribution"—Dr. W. Ray Junk, California & Hawaiian Sugar Refining Corp., San Francisco

ADDRESS: "Factors Affecting Sirup Discoloration"—Donald G. White, F. M. Dixon and F. C. Lamb, Western Research Laboratory, N.C.A.

ADDRESS: "Siruping Operations in the Cannery"—D. S. Brownlee, Customer Research, Pacific Division, Continental Can Company, Hayward, Calif.

Sugar Research for Canners

By Dr. Henry B. Hass,
The Sugar Research Foundation

It was Nicolas Appert, nearly 150 years ago, who made today's canning industry possible by devising a method of preserving foods through the use of heat, sugar, and an airtight seal. Since that time sugar has become a basic ingredient of a host of canned foods, and canners the world over have become some of the most important customers of the sugar industry.

I think it is fair to say that sugar is responsible in no small degree for the progress which made canning a multi-billion-dollar industry. The constantly improving quality of canned foods could not have taken place without a corresponding improvement in the quality of sugar. Application research has led to technical advances in both industries which have been complementary. Three examples come immediately to mind: the development of canners' grade sugar, the manufacture and sale of liquid sugar, and the bulk-handling of granulated sugar. These have removed some of the traditional hazards of canning, such as spoilage, and made possible a more efficient and more economical operation in canning plants.

But there have been other and equally important achievements in flavor research, and it is my purpose today to tell you how these studies are working to benefit the canning industry.

When the Food and Drug Administration first undertook to establish standards for canned fruits, a great deal of testimony was gathered to the effect that all-sugar syrups of high density "masked" the true flavor of the fruit, resulted in "excessive sweetness," and were "cloying." Some witnesses before the Food and Drug Administration indicated that these supposed shortcomings of all-sugar packs were objectionable to consumers, and that they were responsible for a slackening of sales. It was urged, moreover, that the remedy was not to be found in lighter—and consequently less sweet—syrups, but rather in the partial replacement of sugar by dextrose, which has a lower level of sweetness.

These arguments, as persuasive as they may have sounded to those who made them, failed to convince a majority of canners. Nearly 15 years later, and after an aggressive advertising campaign in behalf of dextrose, two-thirds of all canners in the United States were still using all-sugar packs, and all but a microscopic part of the remainder were using mixtures of sugar and corn products—with the corn products constituting far less than the standards permit.

Why this reliance on sugar? Canners' reasons for preferring sugar were summarized in this fashion in a survey conducted by the U. S. Department of Agriculture (Agr. Inf. Bull. 48, p. 142):

"The survey showed that the long association of sugar with high quality canned goods is a major factor influencing many canners to retain their well-established all-sugar packs rather than experiment with other sweeteners. Since canned goods are bought largely on the basis of brand names, many of the larger and more widely-known firms are reluctant to change their formulas for fear of upsetting established consumer preferences. There are canners, of course, who believe that any change from an all-sugar formula actually would result in lowering of quality and that economies, if any, resulting from the use of corn sweeteners in any amounts would be more than offset by a lowering of consumer acceptance for the product. Another advantage of using all-sugar packs, as reported by the canners interviewed, was that it was the only sweetener which could be used alone in a broad variety of items. Handling two or more sweeteners was said to add to in-plant handling expenses and to increase the chance for error in the formulas."

In their reluctance to abandon the traditional all-sugar packs, commercial canners demonstrated better judgment than the outside experts who volunteered advice. What canners have learned of consumer preference through observation and experience is now confirmed by research of the highest order.

For the past two years Dr. Emil Mrak, Chairman of the Department of Food Technology of the University of California at Davis, has been directing painstaking studies to determine what kind of canned fruits are preferred by the greatest number of consumers. His work has embraced not only expert taste panels but, more important, a representative sampling of the consuming public generally. His work will be published in due course, but in the meantime I can report the principal findings.

Consumer preference surveys were conducted at the California State Fair in 1954 and 1955 to determine the preference rating of the dessert quality of three samples of cling peaches packed with straight sugar syrups of varying concentrations. The in-going syrups were 35°, 45°, and 55° Brix. The cut-out syrups, in the same order, were 17.7°, 21.2°, and 24.5° Brix. In all other respects the peaches were very carefully matched.

Before being served the peaches, each participant had sampled 19 other foods. In every case, the taster was given two of three samples and asked to state a preference. Sex and age (under 18 years, 18 to 35, 35 to 50, and over 50) were also noted.

Briefly, the results of the 1954 tests were these:

All participants, both men and women and in all age groups, preferred the 45° Brix pack to the 35° Brix.

All participants, both men and women and in all age groups, preferred the 55° Brix to the 45° Brix.

All participants, both men and women and in all age groups, preferred the 55° Brix to the 35° Brix.

In other words, there was an unmistakable and statistically significant preference for the peaches packed in the syrup of highest density.

In 1955 the tests were repeated at the Fair with more than 3,000 participants. The peaches were canned with in-going syrups of 45°, 55°, 65°, and 75° Brix, and cut-outs of 23.53°, 26.54°, 30.53° and 34.94° Brix. Early and in-

complete tabulations of the second survey show that tasters were unable to distinguish clearly between the samples canned at 45° and 55° Brix, but preferred them to the samples packed at higher levels of sweetness. The second study confirmed the fact that for both years, the consumers preferred a canned cling peach with a cut-out syrup between 23.53° and 26.54° Brix, and a sugar-acid ratio of between 67.39 and 78.13 percent. Data from the 1955 study is now being resolved into preferences according to sex and age.

Now that we know consumers prefer peaches—and other fruits—packed in syrups of relatively high density, the next question is *why* they prefer them. That's a more difficult puzzle, but I feel certain that it can be solved.

Preference in foods is an elusive thing which sometimes involves all the senses but hearing—and it may be that even hearing is a part of our enjoyment of a sizzling steak or popping corn. In discussing the tests at the California Fair, however, we need only deal with taste and aroma, which are always the primary elements in flavor.

Those of you who remember your chemistry courses, however painfully, may recall the so-called "salting-out" experiment. The experiment is performed by making a solution of dve in water, and then adding salt. When the salt is added, the dye comes out of solution. That is a rough illustration of what may happen when a syrup of optimum density is used in canning fruit. It is conceivable, and entirely consistent with recognized principles of chemistry, that sugar used in caning fruit may act as a mechanism for decreasing the solubility and hence bringing about a more rapid evaporation of the molecules which carry the characteristic fragrance of fruit. The aroma, of course, must reach the nose in order to register as flavor.

The explanation of the mechanism is somewhat complex, and unless someone insists I'll not attempt it here. However, laboratory tests have confirmed this general concept and for the first time we have a rational explanation for experiments such as the following experiment carried out by Dr. Mrak and his staff.

In the experiment a taste panel of 16 members, selected for their ability to detect small differences in concentrations of sugar and raspberry aldehyde flavor, were asked to compare paired samples of distilled water solutions which contained one percent of acid and varying concentrations of sugar and artificial flavor. When three sweetness levels of 12.50, 13.75, and 15.00 percent of sugar were used, the ability of the judges to identify correctly the sweetness concentration for all possible combinations was statistically significant. However, they tended to become confused when comparing the intensity of flavor. To elaborate the point, the differences in sugar concentrations were made more pronounced, at 11.25, 13.75, and 16.25 percent. Acid and flavor concentrations remained unchanged.

In the second test, as might have been expected, the judges' ability to distinguish variations in sweetness was greater than in the first trial, but they became even more confused in trying to detect differences in flavor. In both tests, the panel exhibited a tendency to associate flavor with sweetness—that is, they ascribed greater flavor to the sweeter sample, and less to the others. Dr. Mrak has made no attempt to explain this rather curious state of affairs, but unless purely psychological factors are involved it may lend a certain amount of support to the theory I have already discussed.

A study is now under way to determine whether a correlation exists between the results obtained with distilled water solutions and with a natural product. An apricot nectar, consisting of 55 percent apricots and 45 percent water, with a sugar-acid ratio of 18.41 and a syrup of 9.74 Brix is being used.

An apricot nectar is being used, and the panel members are comparing paired samples which may vary in sweetness, acidity, and flavor. A synthetic flavor is being added for control purposes but at a level too low seriously to affect taste. The results should indicate the effects of sugar, acid, sugar-acid ratio, and added flavor on the apparent flavor of apricot nectar. Later, the same tests will be carried out with peach nectar and pear nectar.

Improved quality, color, and flavor have also been reported for red cherries canned with sugar. But there are other advantages as well. Ordinarily, as you know, cherries intended for use as desserts are packed in syrup, while in recent years those intended for pies have been canned in water. The logic behind this is that more sugar must be added to the cherries in making pies—and many canners have considered it wasteful of sugar to use a syrup which must be drained off before the baker puts the cherries into a pie.

Far from following a wasteful practice, the canner who packs his pie cherries in a syrup can actually lower costs while improving his product. This is true because cherries packed in a light syrup have relatively greater drained weight than those packed in water and, as a consequence, it becomes possible to reduce the weight of cherries put into the can. The cost of the sugar in the syrup is more than offset, in most instances, by a reduction in the weight of cherries required.

These facts have been pointed out clearly by C. L. Bedford and W. F. Robertson of the Department of Horticulture at Michigan State University, who carried out extensive tests to determine the effect of various factors on the drained weight of canned cherries. They found that sugar packs increased the firmness and brightness of cherries, and also improved the palatability over those packed in water, either for desserts or pies. Still better scores for dessert cherries were obtained as the density of the syrup was increased, but in pies the palatability scores for high-density packs were not significantly different from those obtained with the use of the lighter syrups.

Now for some considerations of costs. The drained weight of all canned fruits is less than their in-going weight and these losses are greater in fruits packed in water than those packed with sugar.

The United States Standards for Grades of Canned Red Sour Pitted Cherries recommend a drained weight of 12.75 ounces for a No. 2 can packed in syrup of any density, or in "slightly sweetened water." For cherries packed in water, the recommended drained weight of the No. 2 can is 13.5 ounces. To arrive at the drained weights the Michigan State workers found that it is necessary to have an in-going weight of 13.9 ounces of cherries when packed in "slightly sweetened water," which means one ounce of sugar to the No. 2 can, or 14.1 ounces of cherries with a 20 to 30 percent syrup, which requires about 1.5 ounces of sugar. In a water pack, 15.2 ounces of cherries are required to bring about the drained weight of 13.5 ounces.

For a dozen cans (assuming an 80 percent yield of pitted cherries) it was calculated that the amount of fresh fruit required would be 19.5 ounces less in the case of cherries packed in "slightly sweetened water," and 16.5 ounces less for those packed in the 20-30 percent syrup, than in the case of a water pack. With cherries at 8 cents a pound, this amounts to a cost saving of 8.25 to 9.75 cents a dozen cans. Against this saving must be placed the cost of the sugar which, at $9.25 a hundred pounds, would be 7 cents a dozen cans in the case of "slightly sweetened water" and 8.7 cents a dozen cans for the 20-30 percent syrup.

"Comparing these figures with those given for the price of the cherries," according to the Michigan State report, "it can be seen that the cost of the sugar is completely or nearly offset by the reduction in the cost of the cherries for the sugar syrup packs."

The great advantage, of course, is that the cherries packed in sugar have better flavor, better color, and are generally better in quality than those packed in water—all without cost to the canner, and perhaps with a gain.

Even though your primary interest is canned foods, it may not be amiss to mention briefly some of our work on frozen fruits and berries because there, too, the question of flavor was

involved. Our purpose was to determine whether the replacement of sugar by other sweetening agents resulted in any detectable differences in flavor and quality in peaches, red raspberries, blackberries, strawberries, and strawberry preserves. The Arthur D. Little Flavor Laboratories at Cambridge, Mass., an organization known for its extensive research in high quality commercial food production, was chosen to carry out the tests.

In general, and without going into the details of the work, it can be said that the use of dextrose, corn syrup, high conversion corn syrup, and corn syrup solids *does* make a detectable difference in flavor. The level at which the substitution of corn sweeteners for sugar can be detected varies with the product, but in some instances replacements as low as 15 percent were apparent. Differences in quality were also observed. Since substitution can always be detected, and since substitution exerts an unfavorable influence on quality, it follows that for maximum quality the only permissible sweetening agent is sugar.

Finally, a word about the influence of added sugar on the flavor of green peas. Marked consumer preference for frozen green peas to which sugar is added during the packing process has been demonstrated in recent tests conducted by two independent research organizations.

Of 752 women in eight cities who sampled the peas:

525 preferred those to which three percent of sugar by weight had been added.

204 preferred those packed in their natural state without sugar, and

23 expressed no preference.

The tests were conducted at Los Angeles, Oakland, Minneapolis-St. Paul, Detroit, St. Louis, Pittsburgh, Newark, and Westchester County, New York. At Oakland and Los Angeles the tests were conducted by the California Foods Research Institute, which has laboratories in San Francisco.

In the other six cities the work was undertaken by Luncheon Is Served, an organization which has had broad experience in determining consumer preferences.

In no case were the peas identified as being sweetened or unsweetened. Women who participated were simply asked to taste two samples of peas, to tell which they preferred, and the reasons for their preference. Seven out of ten preferred the samples to which the sugar had been added!

Peas used in the tests were packed in August, 1950, at Mt. Vernon, Wash., under the supervision of Food, Chemical and Research Laboratories, Inc., of Seattle, and held at the plant for eight months under commercial storage conditions. The peas were packed in three lots, the first with no added sugar, the second with two percent added sugar, and the third with three percent sugar. In making the taste-tests, for reasons of simplicity only the unsweetened peas and those packed with three percent sugar were used.

There is also evidence that consumers prefer canned corn with a degree of sweetness greater than usually found in commercial packs. In canned tomatoes, however, quite the opposite is true; consumers like them tart, so that they can be sweetened to taste in the cooking or at the table.

From what I have said, it should be clear that the use of sugar in canned fruits is not merely a happenstance, or a tradition handed down from one generation of canners to the next. Sugar in canned fruit improves flavor, color, texture, and shape, which means that quality generally is enhanced. And, most important, consumers like them that way.

Syrups and Syruping Operations from a Canner's Viewpoint

By Lionel W. Richards
Bercut-Richards Packing Co.

The successful canner is one who produces a high quality pack at the least possible cost, thus enabling him to merchandise his product at a profit. To ensure high quality, the canner must not only obtain a fancy grade of raw products, but he must also obtain the best grade of other ingredients, such as water, salt, sugar, and spices, that go into his pack. Usually these added ingredients control the flavor, as well as other qualities of his product. With canned fruits, somewhat more than 25 percent of the contents of the can may consist of sugar syrup used as a packing media.

Sugar syrup is a blend of sugar and water. Both chemical and bacteriological analysis of the water used in preparing sugar syrups should be made. It may be necessary to pretreat the water in order to remove such objectionable chemicals as calcium, sulfur or iron. It is not considered good practice to chlorinate the water used in syrup making, as this may adversely affect the flavor of the product. It is necessary, then, to secure a water which is pure and free from harmful bacteria.

The sugar refiner will furnish the canner with both a chemical and a bacteriological analysis of each lot of sugar purchased; these data will guarantee the necessary high purity. Some of the contaminants to look for are calcium, sulfur as sulfur dioxide, yeasts and thermophilic bacteria. The sugar refiner should also report the percent of total sugar solids in a given lot of sugar. This is particularly important in the case of liquid sugar because the selling price is usually based upon a fixed sugar solids content. In-plant handling and storage must be carried on in a sanitary manner in order to prevent in-plant contamination of the sugar and sugar syrup.

The federal Food and Drug Administration has set up standards of identity for many canned fruits and vegetables. In the case of fruits, the packing media may be sugar syrups of various Brix ranges. The label declaration for the strength of the sugar syrup must agree with the actual strength of the sugar syrup in the can. For instance, a heavy syrup label declaration on a can of yellow cling peaches would require that the syrup in the can test 19 to 24° Brix.

The canner's problem is to balance the variables that affect the final strength of the sugar syrup in order that his label declaration for sugar will meet the Food and Drug Administration requirements. The following variables are to be considered: strength of in-going syrup, fill-in weight of the fruit, sugar content of the fruit, amount of headspace in the can, and length of storage time of the finished product. Blending the entire contents of a sample can in a Waring Blendor will eliminate the storage time variable. A canner must keep daily records of the other variables listed above, as well as his daily cut-out Brix records in order that he may successfully maintain the desired Brix level within the Food and Drug Administration required level.

It is not economical to maintain a level at the upper limits of the required range, nor is it safe to maintain a level at the lower limits of the required range. For instance, in processing yellow cling peaches, it would be desirable to maintain a level of 21° Brix if the heavy syrup label declaration is to be made.

Under certain conditions the sugar content of the fruit may vary from day to day over rather a wide range. There may be a range of as high as 3° Brix in fancy grade pears picked, stored and ripened under different conditions. The range in the Brix of yellow cling peaches of fancy grade may be nearly as great. Peaches may arrive at the plant on a relatively cool summer day and be processed within a few hours after they are picked, or they may arrive at the plant during a warm spell and be held in open storage for 12 hours or more. The sugar content of the latter peaches may be from 2 to 3° Brix higher than that of those processed within a short time after picking. To maintain a constant cut-out Brix level of these fruits, the canner must have a daily knowledge

TABLE 1

CASE SIZE FACTORS

Item	Can Size	Ave. Fill—Wt. Oz. Constant °Brix	Number of cans per case	Ounces per case	Factor for case size
Apricot Hv. Unp.	No. 10	36.00	6	216	.90
Apricot Hv. Unp.	No. 2½	10.00	24	240	1.00
Apricot Hv. Unp.	8 oz.	2.75	48	132	.55
Apricot Whole Unp.	No. 2½	11.40	24	274	1.14

of the sugar content of the fruit that is being processed.

Variations in headspace of a particular can size will cause similar variations in the cut-out Brix of the samples. It is desirable to maintain a constant headspace in the cans in order to obtain the proper vacuum and to reduce to a minimum the variations in cut-out Brix.

Under high volume packing conditions it is impossible to weigh each can and obtain a constant fill-in weight of the fruit. However, check weighing at the end of each filling line will reduce the range of fill-in weight of fruit and reduce the variations in cut-out Brix from this cause. Assuming that the packer wishes to obtain a fill-in weight of 20 ounces with yellow cling peaches of a 10-count size in No. 2½ cans, it is reasonable to expect that a few cans will show 9-count, while other cans will reach 11-count. This variation will give a fill-in range of 4 ounces, which will cause a corresponding variation in the volume of syrup being added to each can. By determining the exact volume relationships and the amount of sugar being added over this extreme range of fill, one can calculate an anticipated range of cut-out Brix. It is necessary for the canner to maintain a sugar strength of in-going syrup sufficient to obtain at least the minimum Food and Drug Administration requirements on excessively filled cans.

The cannery cost accountant must keep an accurate accumulative daily record of the following information:

(1) The weight and cost of sugar solids purchased along with the beginning and closing inventory of this item.

(2) The weight and cost of sugar solids used (this requires a conversion to total sugar solids when liquid sugar is used).

(3) The sugar cost per case by can sizes for each commodity packed.

(4) The labor cost of sugar handling, sugar melting, syrup blending, and syrup preparation. (The actual labor costs of syrup machine operation is usually charged to cook-room labor costs.)

(5) The allocation of the labor costs under item (4) to the various commodities being packed by can size.

(6) Maintenance costs and amortization costs of bulk sugar equipment and liquid sugar storage tanks.

(7) The allocation of the maintenance and amortization costs under item (6) to the various commodities being packed by can sizes.

By analysis of these records, one may determine whether it is more economical for the plant to purchase bagged sugar, bulk sugar, or liquid sugar. A diversified program may prove most economical; using bagged sugar during small daily operations, and bulk sugar or liquid sugar under heavy daily sugar requirements.

The perfect solution of the cost accountant's problem of allocating sugar costs by can sizes and commodities would be to have a sugar syrup meter at each syruping line and charge the sugar used directly to the commodity by can size. It is sometimes possible to have a separate head tank in the syrup room for each syruping line. It is then easy to calculate the daily sugar usage for each syruping line from the syrup room report.

In a large fruit cannery where up to 25 syruping lines may be under simultaneous operation, and where six fruit commodities are being syruped at one time, and where six can sizes are being used, it may be more satisfactory to convert the entire day's syruped pack into basic cases and to allocate the sugar used on that basis.

Under such a system it is necessary to use conversion factors that reflect the sugar used in the various case sizes and the sugar used in the various Brix syrups. In these computations the following two sets of factors are used:

(1) Factors representing the *volume* of syrup used.

(2) Factors representing the *density* of the syrup.

The factors for can and case sizes are developed for each commodity from actual in-plant tests as ratios of the average sugar usage in a 24/2½ case (used as a standard), with the average sugar usage in other can sizes. A theoretical example for one commodity is presented in Table 1.

The factors for various degrees Brix syrups are developed in Table 2.

In Table 2 the conversion factors for the various degrees Brix syrups have been expressed as ratios of 25° Brix syrup, which has been used as the base 1.000. Obviously, of course, any other degree of syrup could be used as a base just as well. It may be convenient, for instance, to use 25° Brix as the base for apricots and yellow cling peaches, while 20° Brix is used as the base for pears and 34° Brix as the base for fruit cocktail.

The weight of sugar in the basic case for each commodity is determined in Table 3 (theoretical data only).

By applying the syrup volume and syrup density factors, the pounds of sugar per basic case for each commodity may be calculated and the scheduled number of pounds of sugar for the entire day's pack may be obtained (Table 4, theoretical data).

It will be found that the actual day's sugar usage as calculated from the syrup room report may be either over or under this scheduled usage (Table 5, theoretical data).

This method of calculation allows for a daily control of sugar usage. Any daily variations, either over or under schedule, require a check-back over the other variables previously listed as well as a tie-in with the daily cut-out Brix level of the syrup for each commodity. The variations also serve as an early indicator of any pipeline or tank leakages and as evidence of any excessive syrup losses in syruping and can closing.

By keeping a record of these variations, a cumulative record of the sugar

TABLE 2

SYRUP DENSITY FACTORS

(1) Degrees Brix	(2) Pounds Sugar per Gallon	(3) Syrup Density factor Col. 2 ÷ (A)
60°	6.45	2.804
55°	5.77	2.509
45°	4.51	1.961
40°	3.92	1.704
25°	2.30 (A)	1.000

TABLE 3

WEIGHT OF SUGAR PER BASIC CASE

(1) Varieties	(2) Brix	Syrup (3) Oz. Avoir. per can ave. of test	Syrup (4) Oz. Avoir. per case Col. 3 X 24	Syrup (5) Pounds per case Col. 4 ÷ 16	Sugar (6) Pounds per case Col. 2 X Col. 5
Yellow Cling Peaches..	25°	9.95	238.80	14.92500	3.73125
Pears	20°	11.52	276.48	17.28000	3.45600
Fruit cocktail	34°	9.95	238.80	14.92500	5.07450

TABLE 4

CONVERSION TO BASIC CASES

Variety	Actual cases	Syrup Volume factor	Syrup Density factor	Basic cases
24/2½ Apricot Hv—H.S.	2.000	1.00	1.704	3.408
6/10 Apricot Hv—L.S.	1.000	.90	1.000	900
Subtotal				4.308
24/2½ Y.C. Peach Hv—H.S.	5.000	1.00	1.704	8.520
48/8 oz. Y.C. Peach Hv—H.S.	500	.55	1.704	469
Subtotal				8.989

TABLE 5

ACTUAL TO THEORETICAL SUGAR USE

	(1)	(2) Pound Used Schedule		(4) Allocation actual pounds used	(5)
Varieties	Number of cases Basic Grade converted	per case Basic Grade	Total Col. 1 ×Col. 2	Col. 3 ×1.04604 see (A) below	Actual pounds per case Col. 4 ÷ Col. 1
Yellow cling peaches	322.768	3.73125	1,204.328	1,259.775	3.90304
Pears	92.922	3.45900	321.138	335.923	3.61511
Fruit cocktail	43.561	5.07493	221.069	231.247	5.30858
Fruit salad	26.004	6.12000	159.145	166.472	6.40178
Totals	485.255		1,905.680	1,993.417	

Relationship of actual to theoretical usage:

Actual usage:

Per sugar dumped — 1,966,919

Recovered from opened cans — 26,498 1,993,417

(A) Theoretical usage — scheduled pounds 1,905,680

Ratio of actual to theoretical —

1,993,417 — 1,905,680 — 1.04604

TABLE 6

DAILY RECORD SUGAR USAGE

		Today			To Date		
Commodity	Date	Basic cases	Pounds per Basic case	Pounds used	Basic cases	Pounds per Basic case	Pounds used
Apricots	7/2	4308	3.825	16478	4308	3.825	16478
Apricots	7/3	6432	3.745	24163	10760	3.777	40641

usage for each commodity will be obtained (Table 6, using theoretical data).

At any time during or at the end of the season the actual pounds per case of sugar used by each commodity by case-size and degrees Brix syrup may be computed (Table 7, using theoretical data).

TABLE 7

POUNDS SUGAR PER CASE

Commodity	Pounds per basic case	Case factor	Brix factor	Pounds per actual case
24/2½ Apricot Hv. H.S.	3.777	1.00	1.704	6.436
6/10 Apricot Hv. L.S.	3.777	.90	1.00	3.399

This conversion method is in actual satisfactory use when on any one day syrup is being prepared for grapes, apricots, yellow cling peaches, freestone peaches, fruit cocktail, and pears. In this case as many as 12 different degrees Brix syrups are being prepared, and up to 6 different can sizes and case sizes are being processed.

The speaker has discussed herein only a few of the many problems faced by the canner in the economical use of sugar in his plant. The method for determining the actual usage of sugar for each commodity by item, case size, and type of syrup has been emphasized. It is only by obtaining this knowledge that the canner can keep daily control of his sugar usage and thus determine his sugar costs per case for any given item of a commodity.

Technical Aspects of Sugar Production and Distribution

By Dr. W. Ray Junk, California & Hawaiian Sugar Refining Corp.

The technical aspects of sugar production and distribution is too large a subject to try to deal with adequately in a short space of time. You, as food processors, would undoubtedly be more interested in the latter phase of this subject than in the theory and practice of sugar production.

Today the canner has available, through sugar suppliers, a product which meets the technical requirements of his industry. In years gone by, problems traceable to sugar were experienced—traces of sulphur and high thermophilic bacteria counts were prevalent. However, the sugar industry and the National Canners Association Laboratories, working together, have almost entirely eliminated these problems.

Sugars well within the tolerances of the National Canners Association standards are available to all canners today. These sugars, packed in paper bags, or delivered to canners in bulk granulated or liquid form, further eliminate the possibility of contamination that existed in the days of burlap bags.

It would be impossible to enumerate all of the technical steps that the sugar supplier employs to manufacture a product to meet the canners' requirements. Of most interest to you would be the development of bulk granulated and liquid sugars that are available and which offer certain technical and economical advantages to the user.

LIQUID SUGAR

Liquid sugar is available in both rail cars and trucks in many sections of the country and will be considered first because of its flexibility and minimum investment on the part of the user.

Technically, liquid sugar is a simple syrup adjusted in density to yield a stable product in storage and yet one with sufficiently high density to give maximum protection from spoilage. The density varies in different parts of the country because of trade custom, but ranges between 66.5 percent and 68 percent dissolved solids. At these densities liquid sugar will not normally crystallize and if properly stored and handled, will resist yeast and mold growths.

Despite the fact that liquid sugar as delivered to the user is at a density that resists microorganism growth, improper storage or handling conditions could alter the product sufficiently to provide ideal media for yeast and mold growth. While low counts of these heat-sensitive organisms may not be important to canners, certainly the development of large

FIGURE 1

LIQUID SUGAR TRUCK

colonies of mold or active yeast fermentation is to be avoided.

When liquid sugar is stored in a closed container, such as a storage tank, moisture condensation usually occurs. If condensation is excessive, the condensate will run down the sides of the tank and dilute the surface film of the liquid sugar, thereby producing an ideal yeast and mold growth environment.

By means of a small fan which draws filtered air through the tank, the moisture laden vapors above the liquid can be swept from the tank to minimize condensation. In addition, ultra-violet lamps, located in the dome of the storage tank are provided to maintain a sterile atmosphere above the liquid level. We have evidence to show that the lamps not only sterilize the circulating air within the tank, but in some cases assist in the sterilization of the surface of the liquid.

With regard to storage tanks for liquid sugar, they should be of sanitary construction, that is — butt-welded joints with the welds ground smooth on the inside. The ultra-violet lamp fixtures, the outlet and inlet connections, level gauge and other accessories, should be so designed as to avoid ultra-violet blind spots in the tanks or areas where condensation might occur. Also, they should be so built that they drain completely to facilitate washing. Most canners' tanks are fabricated from steel. When constructed properly, they can be sand-blasted and lined with a good grade of baked plastic lining. This type of lining has demonstrated that it will withstand the intermittent use required by canners' liquid sugar systems, and give excellent service.

Pumps should be of such construction that they can be easily cleaned and that they drain completely when flushed with water. They should also be constructed of, or trimmed with, non-ferrous material to avoid development of specks and rust which might find their way into the product. Pipe lines, if possible, should be of non-ferrous construction or as a minimum, a good quality galvanized iron.

By properly sterilizing the storage tanks prior to filling and by maintaining a circulation of air in the tank, plus operation of high efficiency ultra-violet lamps, liquid sugar can be stored for any reasonable time required by the canner.

The distribution systems in the user's plant require care in installation to give satisfactory operation.

FIGURE 2

LIQUID SUGAR RAIL CARS

FIGURE 3

TYPICAL CANNERS' LIQUID STORAGE INSTALLATION

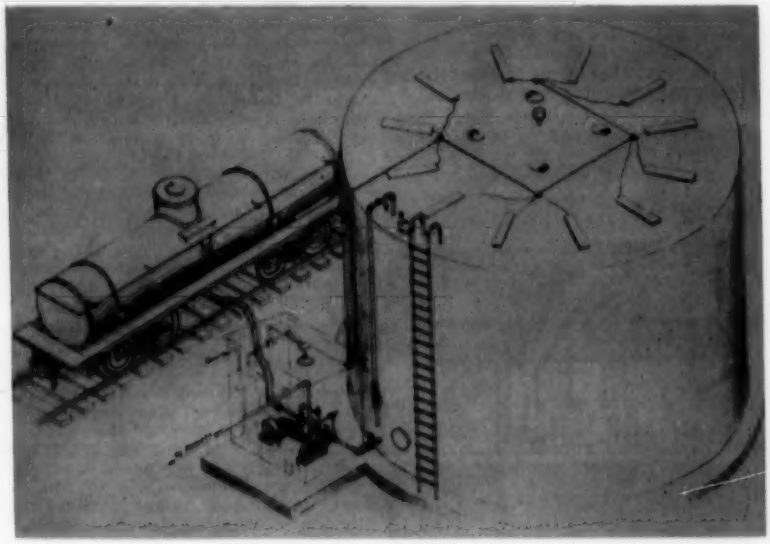
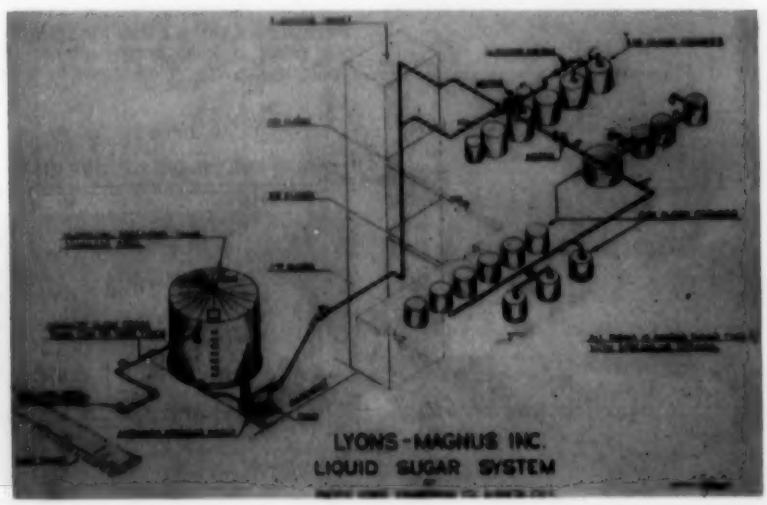


FIGURE 4

LIQUID SUGAR INSTALLATION USED BY A PRESERVER



Not only is it necessary to have the right size pumps, motors and pipe lines to meet production requirements, but the types and method of installation are important to avoid contamination and consequent difficulty.

They should be installed in such a manner that they slope sufficiently to permit easy washing and drainage.

If pressure systems are used, they should be so designed as to eliminate any possible source of microorganism infection.

From the above few comments I do not mean to infer that liquid sugar is a sensitive product to handle, but it is necessary that certain precautions in the design and installation of liquid sugar receiving and distribution systems be followed. I would urge anyone who is considering a liquid sugar installation first to consult with his sugar supplier to determine the availability of the product, and to seek his assistance in engineering the design and specifications for a system. After all, the sugar producers have had years of experience in handling liquid sugars in the sugar plant, and this experience is available to you merely for the asking. They can provide not only specifications and drawings of tanks and all accessories, but also rec-

FIGURE 5

TYPICAL LIQUID SUGAR INSTALLATION FOR ONE-FLOOR OPERATION

This system provides for receiving liquid sugar by motor truck. Pump on truck discharges to customer's tanks through approximately 35 feet of 3-inch line. Positive displacement pumps located adjacent to storage tanks transfers product to automatic pressure tank through approximately 8 feet of 2-inch line. Distribution to process is by pressure tank through approximately 75 feet of 2-inch and 1½-inch line. This installation is estimated to cost from $2,900 to $3,500.

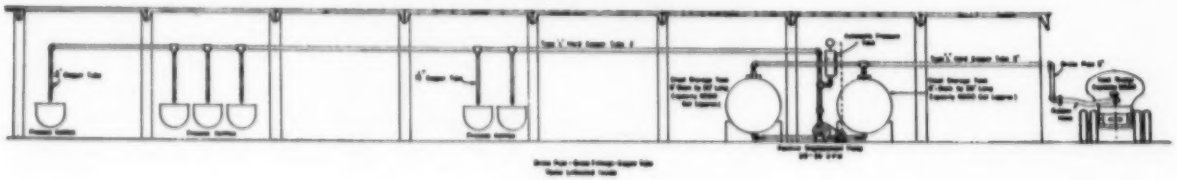


FIGURE 6

TYPICAL LIQUID SUGAR INSTALLATION FOR MULTIPLE FLOOR OPERATION

Tank car discharges by gravity to customer's pump, which transfers product through approximately 62 feet of 3-inch line to storage tanks in upper part of building. Distribution to process is by gravity through approximately 50 feet of 2-inch and 1½-inch line. This installation is estimated to cost from $4,000 to $5,000.

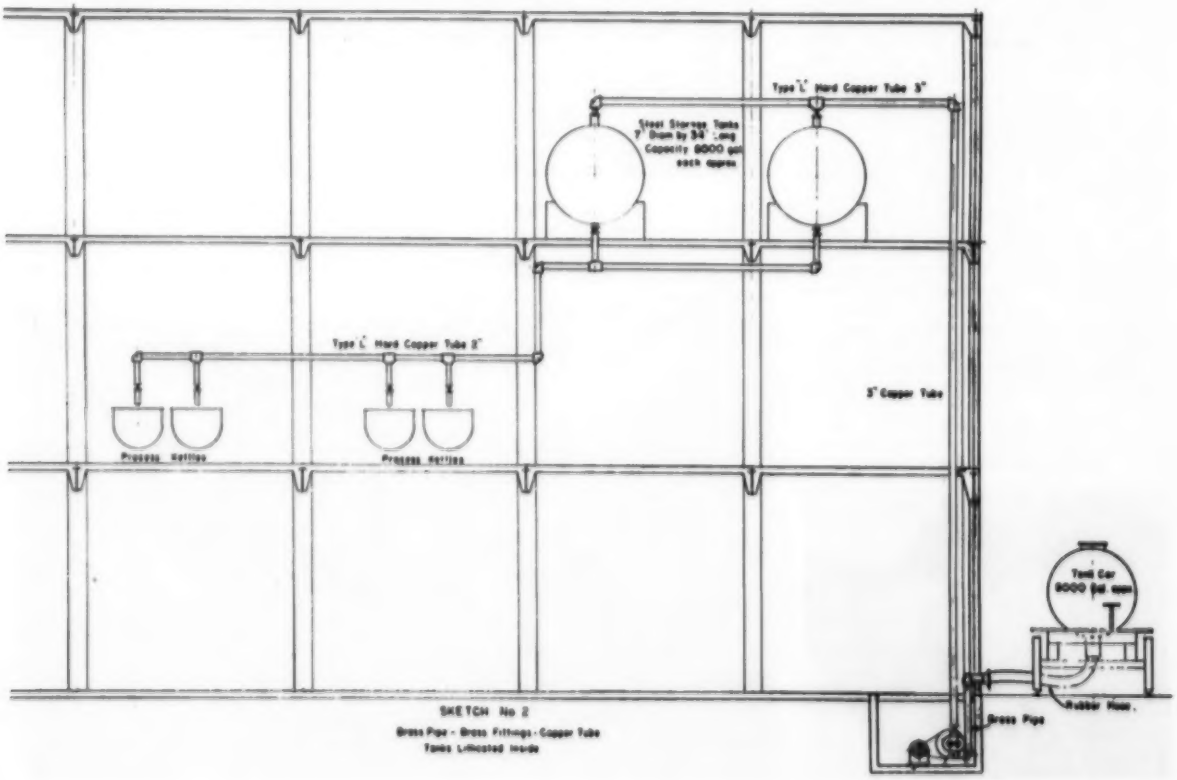


FIGURE 7

CLOSED LOADING OF LIQUID SUGAR FOR TRUCKS AND RAIL CARS

ommendations for adequate pumps and piping to give you a system which will not only be adequate with regard to capacity, but will give you a system that will require a minimum of maintenance and will be free from difficulty from a sanitation standpoint.

Sugar producers offering liquid sugar through the years have developed liquid sugar handling techniques designed to provide the user with an essentially sterile product. One of these which may indicate the care that is taken is the closed loading feature for trucks and rail cars. This feature is particularly appropriate on the Pacific Coast where an unusually heavy bee population is prevalent during the canning season.

Cleaning procedures recommended for users of liquid sugar have been developed which are available from your sugar supplier and indicate the practices that should be followed in the user's plant.

In general, canners should thoroughly clean their liquid sugar systems prior to their operating season. This should include a very careful inspection to make sure that no rust nor scale have developed within the tanks. The ultra-violet lamps should be checked for operating efficiency and replaced if necessary. A solution, using chlorine as the disinfectant, having at least 100 ppm residual chlorine should be used to flush the system after it has been thoroughly washed with hot water. The chlorine-containing solution should be completely drained and the ultra-violet lights turned on at least a day prior to receipt of liquid sugar. At the close of the season, the same procedure should be followed—the storage tanks and distribution systems should be thoroughly and completely washed with hot water and the entire system flushed with a chlorine solution. The entire system should then be drained completely and if possible, the storage tanks should be hot-air dried and sealed.

For those who are operating a liquid sugar system throughout the year, or intermittently throughout most of the year, it is recommended that at least once a year, and preferably twice a year, the entire system should be washed as described above. The ultra-violet lamps in these instances should be checked twice a year.

The most recent development to further improve cannery operation in connection with the use of liquid sugar is equipment to provide automatic dilution of liquid sugar to the density desired by the various canning lines. This equipment not only reduces labor costs by eliminating cutting-tank labor, but provides a much more uniform density going to process. Installations of automatic density control are reported to have paid for themselves several times in one season by more accurate control of on-going syrup densities.

In addition to the advantage of purchase price saving, in-plant labor saving, space saving (by eliminating cut-in tanks and sugar storage areas), liquid sugar materially improves sanitation of the cannery. Because of its closed system danger of rodent contamination and insect infestation is eliminated. In addition, the over-all sanitation and appearance of the plant are improved. Spillage of sugar from bags around the melt tank area and from damage inflicted by fork truck operations, are non-existent.

BULK GRANULATED SUGAR

Bulk granulated sugar also is available to food processors in many sections of the country and offers many of the advantages of liquid sugar. This sugar is of the same high quality as that available in 100-pound containers. Delivery again varies from one section of the country to another, but bulk granulated sugar is available in bins, rail cars, and trucks (both gravity and pneumatic).

FIGURE 8

RAIL CAR FOR BULK GRANULATED SUGAR

FIGURE 9

BOTTOM DUMP TRUCK FOR BULK GRANULATED SUGAR

FIGURE 10

CLOSEUP OF BOTTOM DUMP TRUCK

FIGURE 11

END DUMP TRUCK FOR BULK GRANULATED SUGAR

FIGURE 12

PNEUMATIC DELIVERY TRUCK

FIGURE 13

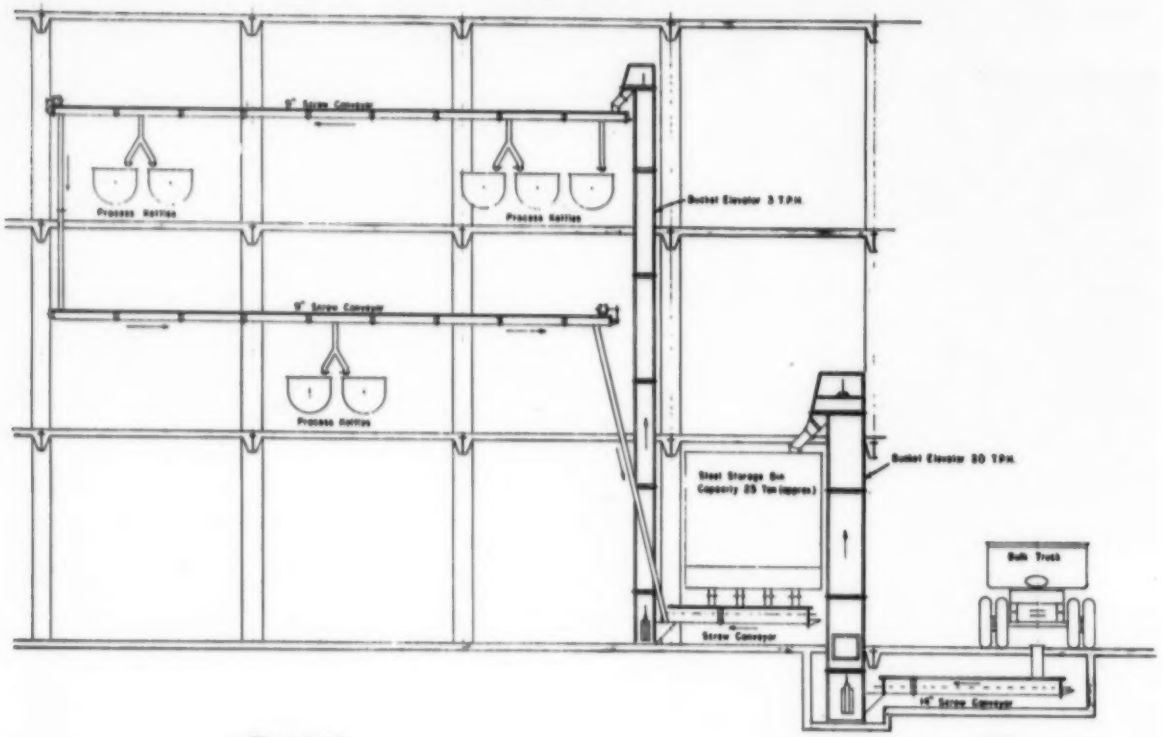


FIGURE 14

TYPICAL BULK GRANULATED SUGAR HANDLING AND STORAGE FACILITIES FOR EITHER BOTTOM-DUMP OR REAR-DUMP TRUCKS

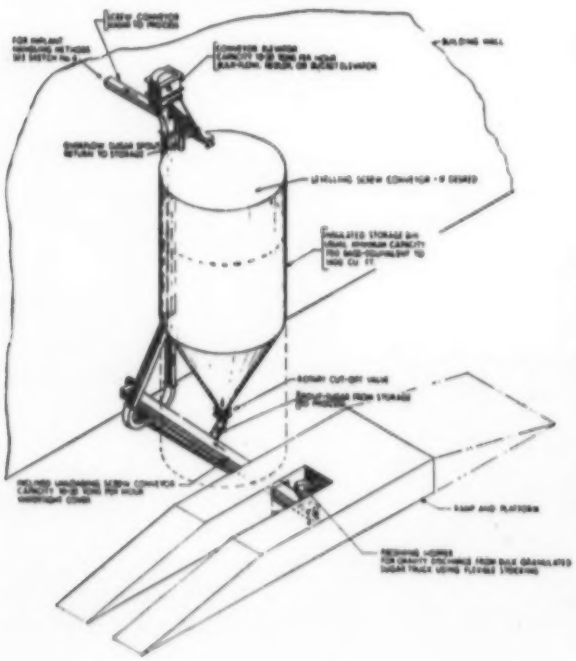


FIGURE 15

TYPICAL BULK GRANULATED SUGAR HANDLING AND STORAGE FACILITIES FOR PNEUMATIC RECEIVING

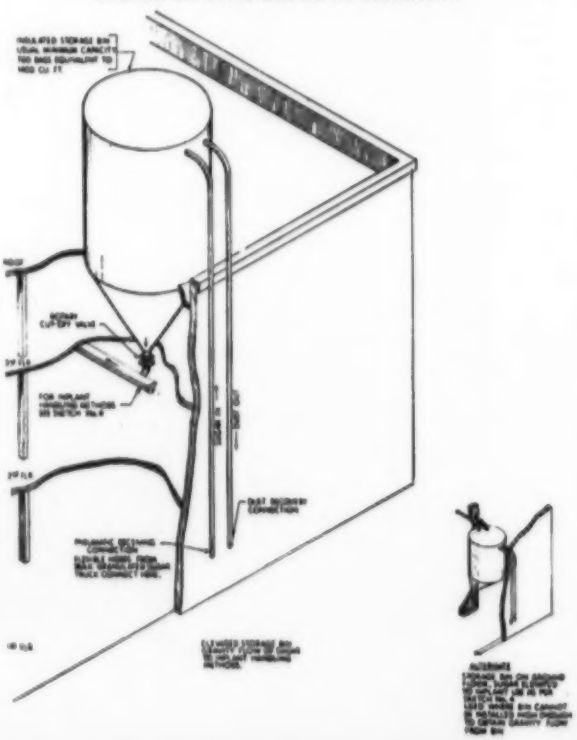


FIGURE 13

TYPICAL BULK GRANULATED SYSTEM FOR MULTIPLE FLOOR OPERATION (at left)

This system provides for discharging bulk refined sugars, received in motor trucks, into a depressed screw conveyor which feeds a bucket elevator. Sugars are elevated into a steel storage bin of approximately 25 ton capacity from which distribution to process is via secondary elevator, circulating screw conveyor, and spouts. This installation is estimated to cost from $14,000 to $17,000.

The same rigid inspection and cleaning procedures are followed in preparing transportation equipment for bulk sugar as are applied to liquid sugar to insure complete protection to destination.

Receiving of the sugar, conveying to storage and direction to process, are designed in closed systems to eliminate possibility of contamination. Distribution within the user's plant to the point of use, varies as the construction of the individual plant varies.

A receiving system, a storage bin, and distribution systems make up the integral part of a bulk sugar handling installation. The receiving system is designed in such a fashion to avoid rain wetting the sugar and causing serious caking hazards in the storage bin. Also, the sugar is protected by a connecting device from the unloading conveyor to the transportation equipment by a sanitary connection unit which is generally made of plastic or rubber.

Storage bins, if located within the processing plant, are either of simple wood or metal construction. In some cases either insulation on the outside of the storage bin or a wood lining within the tank, made of maple or masonite, is a common practice.

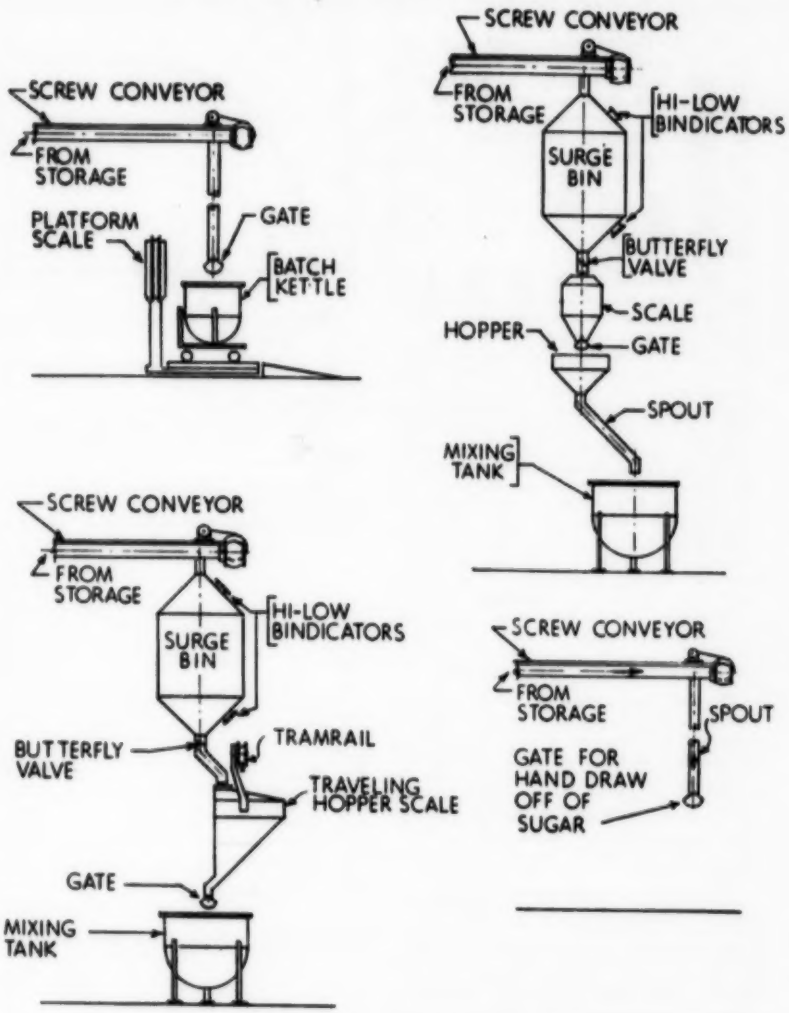
Insulation is desirable in most instances to avoid condensation of moisture which would result in the sugar caking in the area adjacent to the walls of the storage bin. Figure 16 indicates a variety of distribution systems that are in use, one of which—or a combination of which—would fit most any food processing plant requirement.

With bulk granulated sugar, as with liquid, there are many features of design which are important to the sugar user to avoid interruption of operations and a low maintenance performance. You are again urged to contact your sugar supplier regarding availability of bulk granulated sugar and for assistance in designing bulk granulated handling systems.

Again, may I repeat, your sugar supplier is ably equipped to assist you in designing your liquid, bulk or bin handling systems. There are many precautions that need to be taken into consideration and the problems that normally are associated with mechanical handling of sugar can be avoided by asking for assistance of those who are best equipped to help.

FIGURE 16

METHODS OF DELIVERING SUGAR TO PROCESS



Factors Affecting Sirup Discoloration

By Donald G. White, F. M. Dixon and F. C. Lamb, Western Research Laboratory, National Canners Association

In the canning of fruits, the customary procedure is to add hot sirup to the cans just prior to exhausting. This practice is usually considered necessary to obtain sufficient vacuum in the cans, even in many canneries where steam flow or vacuum closing is used. The sirup is heated and held in storage tanks before it is used. Common temperatures employed are 180° F. to 190° F.

Canners have reported that in certain instances sirups have developed a yellow to brown color after prolonged holding at this elevated temperature. Ordinarily, this condition is not too objectionable; however, there has been a sufficient number of cases where the color has been pronounced enough to downgrade the quality, that a laboratory investigation of the problem was considered justified. A typical example is a pack of pears prepared by the N.C.A. laboratory using darkened sirup. When compared with a control packed in normal bright sirup, these samples were considered discolored enough to be practically unmarketable.

The main questions to be answered were why some sirups would discolor and others would not, and what measures could be taken to avoid the trouble.

Sirups for canned fruits may consist of straight sucrose (made from dry or liquid sugar), a mixture of sucrose and dextrose, or sucrose and corn sirup. The standards of identity of fruit products permit up to one-half of the dry sugar solids to consist of dextrose and up to one-third of corn sirup. Going-on sirups range from about 25° Brix for light sirups to about 55° Brix for extra heavy sirups.

Accordingly, the aim of this investigation was to determine the rate and extent of discoloration of corn sirup, dextrose, and sucrose when made up into sirups, heated, and held at a constant temperature. Variables introduced were pH, types of water used to make up the sirups, and strength of the final sirup. Samples of products normally supplied to the canners were obtained from several manufacturers of corn and sucrose products. The sugars used, together with analytical values for moisture, ash, dextrose equivalents, and sulfur dioxide, are shown in Table 1. Distilled water, natural water used in a California cannery (which is a soft water), and artificially hardened and alkalized waters were used.

Experimental Procedure

Sirups were made by dissolving the various sugars in one of the waters under investigation. The desired sirup strength was arrived at by testing the solution with an Abbe type refractometer, using the conversion tables for sucrose and for 42 percent or 52 percent Dextrose Equivalent corn sirup, depending on the type of sugar used.

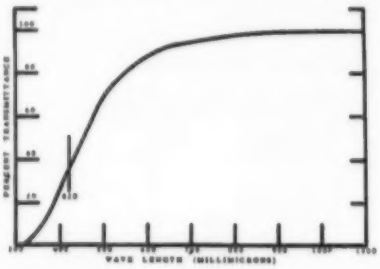
The samples were heated by placing them in Pyrex test tubes (17½ x 2 cm) and immersing the tubes in a water bath, thermostatically controlled at 185° ±2° F. At intervals, portions of the sirup were removed, cooled to room temperature (70°-75° F.), and the light transmission determined in an Evelyn colorimeter using a dark blue filter having a maximum transmission at 420 millimicrons. While this filter does not measure the minimum transmission as shown on a spectrum curve of a typical discolored sirup as determined with a Beckman DU spectrophotometer (Figure 1), it was the best available and analysis of the data obtained shows that ample sensitivity for this experiment was attained.

The relationship between the percent transmission and the appearance of the color is approximately as follows:

100 percent to 90 percent transmission—no color to slight trace of yellow

Figure 1

Spectrum Curve of a Typical Discolored Sirup as Measured on a Beckman DU Spectrophotometer



90 percent to 80 percent transmission—light yellow

80 percent to 50 percent transmission—definite yellow becoming increasingly brighter

50 percent to 0 percent transmission—yellow orange through orange to a dark brown

While the appearance of the discoloration depends on both the amount of darkening and also the natural color of the fruit—for example, a pack of peaches will tolerate a darker sirup than pears—it is felt that any sirup showing 50 percent or less transmission would be definitely objectionable.

Effect of pH on Discoloration

A. pH Adjustment of Sirups Made From Distilled Water—To determine the effect of pH on the discoloration, sirups made by dissolving or diluting the sugars with distilled water were adjusted to various pH levels by the addition of citric acid or sodium carbonate. The results are shown in Table 2.

The data indicate that pH is an extremely important factor in this discoloration. With pH values over 4 or 5, the effect on corn sirup is much greater than on sucrose. Sucrose was stable between pH 4 and pH 7, while the tendency of corn sirups to darken gradually increased as the pH increased above 4. Where the pH was increased to 9, all corn sirups tested became decidedly discolored in one hour. It should be noted, however, that the normal pH values of corn sirups were found to be in the range of 4.5 to 6.6. Sucrose was moderately

Table 1
Identification of Sugars

Code	Type of Sugar	Inversion (Corn Sirups)	Moisture (%)	Ash (%)	Dextrose Equivalent (%)	Sulfur Dioxide (PPM)
A	Corn	Acid-Enzyme	17.3	0.004	43	6.4
B	Corn	Acid	18.4	0.002	43	16.6
C	Corn	Acid	18.5	0.002	54	6.1
D	Corn	Acid	19.1	0.002	42	9.3
E	Corn	Acid	18.6	0.002	52	17.9
F	Liquid Cane		33.1	0.009		
G	Liquid Beet		32.9	0.008		
H	Dextrose		7.9	0.000		
I	Sucrose (Cane)		Trace	0.000		
J	Sucrose (Beet)		Trace	0.000		

Table 2
Effect of pH on Discoloration of Sirups Made with Distilled Water

Sample	Solids (%)	Original pH	Adjusted pH	pH After Heating	Percent Transmittance 1 Hour	4 Hours	8 Hours
Corn Sirup A	53	5.0	3.2	3.2	100	99	96
			3.6	3.6	100	98	96
			3.9	3.9	100	99	96
			5.0	4.4	98	97	92
			6.4	4.5	98	96	90
			9.0	5.8	15	13	7
Corn Sirup C	55	4.5	3.1	3.4	100	97	95
			3.9	3.9	99	96	91
			4.5	4.3	99	96	91
			5.2	4.7	97	94	81
			9.1	5.9	5	2	1
Sucrose (Cane) I	55.1	7.2	3.0	3.1	100	99	96
			3.3	3.4	100	100	95
			3.7	3.7	100	100	99
			4.6	5.3	100	100	100
			5.1	5.0	100	100	100
			7.2	6.0	100	100	98
			9.0	8.9	95	80	63
Dextrose H	42	7.5	3.9	3.9	99	99	98
			5.2	5.0	99	99	89
			9.0	6.1	29	9	4

TABLE 3
IDENTIFICATION OF WATERS

Code	Hardness PPM	Alkalinity PPM	pH
a	149	253	8.3
b	252	252	8.2
c	349	250	8.3
Cannery	40	45	7.3
Distilled	0	0	6.0

yellow at pH 9 after 8 hours. The normal pH of sucrose sirups were found to be in the range of pH 7.0 to 8.0.

It was noted that the pH decreased as the sample was heated. This change was greatest at pH 9 and became less as the pH decreased and was negligible at about pH 4. However, the initial pH of heated sirups is the deciding factor in causing discoloration.

B. Effect of Composition of Water on Discoloration—The pronounced effect of pH on the discoloration of sirups would lead to the supposition that the composition of the water would influence the rate of discoloration since hard waters are generally alkaline in reaction and might be expected to raise the pH of sirups made from these waters. A series of waters were prepared artificially to represent various types of hard and alkaline waters. The composition of these waters is shown in Table 3. Hardness was produced by dissolving calcium chloride and magnesium sulfate in distilled water to produce the degree of hardness required. The ratio of calcium to magnesium was 2 to 1 in terms of the carbonates.

Alkalinity was produced by dissolving sodium bicarbonate in the water to produce the required alkalinity as determined by titration to pH 4.0 with 0.02 N sulfuric acid.

Sample "a" represents a hard water in which the alkalinity exceeds the total hardness. Sample "b" represents a hard water in which the hardness is exactly equal to the alkalinity. Sample "c" represents a water in which the hardness exceeds the alkalinity. In addition, a sample of cannery water representing a soft water was included.

Representative samples were made up in each of the above waters and heated at 185° F. In addition, the sirups made up in the prepared water were adjusted to various pH levels.

The results of the effect of water composition differences on three representative samples are shown in Table 4.

In the artificially prepared water samples "a", "b", and "c", the alkalinity was adjusted to a constant value representing moderately alkaline water. The hardness was considered moderate, hard, and very hard.

The data show that, while there are differences in discoloration which favor the soft and distilled waters, any darkening can be more closely related to the pH of the sirup than to the composition of the water.

Table 5 shows the effect of pH changes on varying the pH in solutions of various sugar samples in water "a". These are essentially the same results as were obtained with some of these same sugars in distilled water. That is, by maintaining a satisfactorily low pH darkening will not occur to any noticeable extent.

COMPARISON OF VARIOUS TYPES OF CORN SIRUP AND SUCROSE

In order to compare the various types of corn sugar and sucrose, the data which represent the sirup samples to which no acid or alkali adjustment was made have been taken from Table 4 and plotted in Figure 2. These are solutions in moderately hard

FIGURE 2
COMPARISON OF THE DISCOLORATION OF VARIOUS CORN SUGAR PRODUCTS AND SUCROSE PRODUCTS HELD AT 185° F. FOR 8 HOURS

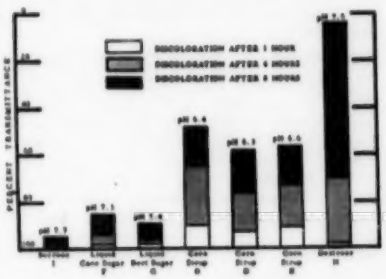


TABLE 4
THE EFFECT OF WATER COMPOSITION ON SIRUP DISCOLORATION

Water Code	Hardness (PPM)	Alkalinity (PPM)	pH of Water	pH of Sirup	Darkening After 8 Hrs. (% T)
Sirup Sample A—Corn Sirup Acid-Enzyme Inversion DE43					
a	149	253	8.3	7.5	65
b	252	252	8.2	7.2	58
c	349	250	8.3	7.1	57
Cannery	40	45	7.3	6.4	90
Distilled	0	0	6.0	6.4	90
Sirup Sample C—Corn Sirup Acid Inversion DE54					
a	149	253	8.3	5.2	86
b	252	252	8.2	6.6	33
c	349	250	8.3	6.5	40
Cannery	40	45	7.3	5.2	86
Distilled	0	0	6.0	5.2	81
Sirup Sample S—Sucrose. Pure Cane Sugar.					
a	149	253	8.3	7.7	95
b	252	252	8.2	7.7	87
c	349	250	8.3	7.5	88
Distilled	0	0	6.0	7.2	98

Note: All Solutions Were Made to a Brix of 54°–56°.

TABLE 5
EFFECT OF pH ON DISCOLORATION OF SIRUPS MADE WITH WATER "A": HARDNESS 149 PPM, ALKALINITY 253 PPM

Sample	Solids (%)	Original pH	Adjusted pH	pH After Heating	Percent Transmittance		
					1 Hour	4 Hours	8 Hours
Corn Sirup B	55	6.4	4.0	4.1	100	96	93
			6.4	5.5	90	65	48
			9.0	6.2	11	4	1
Corn Sirup D	54	6.3	4.0	4.0	98	94	90
			6.3	5.2	93	76	58
			9.0	6.2	12	4	2
Corn Sirup E	55	6.6	4.0	4.0	100	97	93
			6.6	5.3	91	73	56
			9.0	6.0	10	4	1
Liquid Cane Sugar F	55	7.3	4.0	4.1	100	100	99
			7.3	7.3	99	94	85
			9.0	8.5	82	56	42
Liquid Beet Sugar G	55	7.4	4.0	4.2	99	99	98
			7.4	7.5	98	96	89
			9.0	9.0	94	81	68
Sucrose (Beet) J	56	7.7	3.7	3.7	98	97	94
			7.7	7.6	100	99	95
			9.0	8.9	93	76	58
Dextrose H	42	7.5	4.0	4.0	99	86	13
			7.5	6.0	99	70	4
			9.0	6.1	95	54	1

water "a", and the pH is the result of the pH of the water as affected by the composition of the sirup.

Where sugar solutions were heated at 185° F. for eight hours the results indicate that sucrose and liquid sucrose are least discolored, followed by corn sirups, with dextrose the most affected.

The Effect of Sirup Concentration

Extra heavy (55° Brix), heavy (45° Brix), and light (26° Brix) sirups were made up with distilled water and subjected to 185° heating for eight hours. Pure cane sucrose and corn sirup of 54 percent dextrose equivalent (sample "C") were selected as typical sugars being used for canned fruits. The pH was adjusted so that samples of acid, normal, and alkaline sirups were used. The color changes of these are shown in Table 6.

Table 6

The Effect of Sirup Concentration

Solids (%)	Original pH	Adjusted pH	Percent Transmittance 1 Hour	4 Hours	8 Hours
Sucrose—Cane Sugar in Distilled Water					
55.1	7.2	4.6	100	100	100
		7.2	100	100	98
		9.0	95	80	64
40.3	7.2	4.1	100	99	95
		7.2	100	96	86
		9.0	99	91	80
26.2	7.0	4.1	100	98	96
		7.0	99	99	98
		9.0	100	97	91
Corn Sirup C—Corn Sirup 54 D.E. in Distilled Water					
55.0	4.5	3.9	99	96	91
		4.5	99	96	91
		5.2	97	94	81
		9.1	5	2	1
41.1	4.6	4.0	100	98	92
		4.6	100	94	90
		9.0	26	12	8
25.8	4.7	3.9	100	100	99
		4.7	100	96	91
		9.0	53	26	14

There is no significant difference between the three sirup strengths at the acid or normal levels, but at pH 9, there is a moderate but definite increase in darkening as the concentration is increased. The sucrose sample, even at the extra heavy strength only slightly darkened, but at pH 9, the corn sirup became dark brown.

Summary

The results of these experiments indicate that, of the factors investigated, pH is the most important, and prolonged heating of any sirup at high pH will cause discoloration and should be avoided. Discoloration is slightly more pronounced in hard water than in soft water, and in heavier sirups than in light sirups.

The critical upper pH values are about 5 for corn sirups and 7 for sucrose sirups. Acidification of any sirup which tends to discolor will remedy the problem.

Syruping Operations in the Cannery

By D. S. Brownlee, Continental Can Co.

It is interesting to review the history of syruping operations in fruit canneries over the years and to note the gradual changes. This important unit operation has undergone considerable change over the past 25 years, yet we find few references to these changes reported in the literature.

Progress in syruping operations has been a slow and gradual evolution of equipment and methods of application—from the first hand syruping through tank syruping, dripline syruping, and mechanical rotary syruping, to the present-day high speed volumetric syrupers. The development and application of the latter type units predates World War II to some degree, but the most vigorous progress has occurred in the years since 1946.

During World War II, canners were forced to contend with sugar restrictions and government allocations. This forcibly brought to their attention the necessity for stretching the sugar allotment over the maximum number of cases and still meet the minimum standards for cut-out syrup. The necessity for adequate control of syrup became paramount and gave impetus to much of the development work which has occurred in the postwar period.

Facing the canner today are the ever-increasing problems of steadily rising costs of materials, labor, and equipment on one hand, and complying with federal standards regarding fill of container, specifications for syrups, etc. and various state regulations regarding the packaging and shipment of food products on the other hand. To balance cost factors against meeting required standards demands, as never before, strict adherence to an over-all "cost control" program. In this connection, the syruping operation—one of the most important unit operations in the cannery—deserves scrutinizing, as controlling this operation can effect a considerable saving in cost, reflected by a saving in material.

The Function of Syrup in Canning

A discussion of syruping operations in the cannery would be incomplete without briefly reviewing the reasons for using sugar syrups in canning and how they affect the quality of the finished product.

Sugar syrups are added to canned fruits for the following reasons:

(1) To improve and conserve flavor.

(2) To exclude air (oxygen) by more or less completely filling the can.

(3) To improve the appearance and quality of the finished product by retaining most of the original texture of the fruit.

In addition, syrup tends to lessen mechanical injury due to various pieces of fruit in a can bumping each other when cans are handled roughly in transportation. Syrups also have some strengthening effect on fruit tissues owing to osmotic changes and tend to prevent disintegration of the edges and cut surfaces of fruits or breakdown of soft and fragile berries. The more concentrated or heavier syrups display these effects of reduced breakdown and mechanical injury to the greatest degree. (1) An incidental, but important factor, is the food value contributed by the syrup.

Preparation of Syrup for Canning

Sweeteners for syrup consist of sucrose, dextrose, glucose, and corn syrup. Liquid sucrose is most commonly delivered at 66.5° Brix, while corn syrup is usually delivered to the canner at an 81° Brix. The method of making and handling syrup in the cannery depends upon the quantity used. The simplest method is to make the syrup in tanks equipped with steam coils or in steam-jacketed kettles. In small canneries, the syrup is generally made in a tank alongside the canning line, whereas in larger canneries, syrup preparation usually is carried out in a separate location and the syrups are transferred through pipes to the syruping machines.

In making syrup in the cannery, the water and sugar need to be stirred while heating. Mechanical agitation generally has been found satisfactory. Compressed air has been used for agitation, but elaborate precautions are necessary to prevent contamination. The syrup is heated until clear, impurities which coagulate are removed by skimming and the heavy stock may then be filtered for further clarification on transferring to dilution tanks.

Since the end of World War II, liquid sugar has established itself in several fields, particularly in the canning industry. Liquid sugar systems provide a degree of flexibility unmatched with other sugar handling methods. Use of proportioning pumps permits accurate measurements for continuous processing, and uniform sugar dispersal helps cut critical mixing and blending cycles.

Ideally, syrup mixing equipment should be made of stainless steel or other inert materials although galvanized iron tanks have proved reasonably satisfactory in some canneries. The syrup tanks should be constructed so that they may be readily cleaned and sterilized. A conical or similarly shaped bottom to permit more efficient draining is desirable. If coils are used in heating, they should be closed to prevent dilution or contamination of the syrup with off-flavors from the steam. Preferably, coils

should be of stainless steel, nickel alloys or similar material.

In the syrup distribution system, it is wise to avoid black iron piping; satisfactory results have been obtained with galvanized iron pipe and bronze valves. Here again, complete sanitation is essential, and it is important to insure that there are no low sections or dead ends in the lines so that they can be efficiently flushed and cleaned. (1)

Controlling Solids Content

Automatic syrup blending equipment has been developed which enables the fruit canner to obtain any desired degree of syrup concentration. Such installations, however, are costly and have not been entirely satisfactory from the standpoint of flexibility. The syrup preparation room of any cannery may, at any given time, have in storage, or in preparation, as many as four to eight different concentrations of syrup. The automatic syrup blending equipment available today generally requires a complete line for each syrup; although a small savings in manpower is effected with an automatic system, this is offset by the high initial cost of automatic equipment. There can be no question, however, that the cannery of the future will have fully automatic gravity control equipment that will instantly blend the sweeteners and water to the desired concentration of solids, efficiently and economically.

A semi-automatic, manually controlled system of preparing and controlling the solids content of the syrups is the procedure generally used in canneries today. A concentrated syrup, generally made up to 60° Brix, is used, and from this concentrate the various lighter syrups may easily be prepared.

The need for very strict control in preparing the various syrups in the cannery cannot be too strongly emphasized, as the necessity for determining the proper Brix syrup for packing is of the utmost importance. The following illustration points up the need for strict control: A cannery, either through poor supervision in the syrup preparation room or through inadequate quality control, has been using a 25° Brix sucrose syrup, when actually a 24° Brix syrup was adequate. The following factory conditions prevail: (1) A line speed on 401 x 411 size cans of 150 cpm per 18-hour day, which is equivalent to 6,750 cases (24's); (2) A syrup use of 240 fluid ounces per case of 401 x 411 cans; (3) A base cost of $8.45 per hundred (dry weight) of sucrose. Under the above conditions, the cost of 25° Brix syrup for 6,750 cases would be roughly $2,459, against a cost of $2,352 for the 24° Brix syrup, or a total difference of $107. The monetary savings formulated here on a theoretical basis are not without actual duplication in various canneries. One California packer of yellow cling peaches realized a saving of $17,500 in sugar in the first year that a strict syrup control program was inaugurated. Another packer of apricots, during one season realized a saving of $10,000 in sugar savings through a program of syrup control.

How can adequate controls be set up in a cannery? First, the proper equipment must be available for determining the soluble solids content of the syrup and blend Brix.

Second, a proper and adequate control program tailored to meet the needs of the individual cannery, must be established. Third, the control program must be under the direct supervision and control of personnel who are adequately trained and qualified to maintain such a program.

Testing Equipment

The following equipment is suggested to maintain an adequate syrup control program:

(1) Refractometer.

(2) Brix hydrometers.

(3) Waring, or similar type, blender.

(4) Laboratory glassware, including 200 ml. graduates, beakers, etc.

(5) Filter paper.

(6) Tables of the following:

(a) Temperature corrections for refractometers and Brix hydrometers.

(b) Degree Brix, refractive index and specific gravity of sugar (sucrose) solutions.

(c) Weights per U. S. Gallon of sugar (sucrose) solutions.

Syrup Control Program

An adequate syrup control program will depend upon the size and complexity of the cannery operation. Dependent upon the degree of control desired, the following points are suggested for incorporation into a control program:

(1) Determination of Brix, or soluble solids, on composite samples of incoming raw fruit. Hourly checks are recommended, if possible, in order to maintain a close relationship between the Brix of raw fruit and syrup and the resultant cut-out Brix.

(2) Determination of cut-out Brix, as measured by blending the contents of the container, and measuring the soluble solids content by refractometer. It is suggested that minimum hourly determinations of this factor be maintained to ensure proper and adequate soluble solids content of ingoing syrup.

(3) Close supervision of fill-weights of fruit. It is imperative that the canner establish standards of raw product fill for each fruit and for each container size. These cannery standards of fill should include a specified fill weight, a range for any single can, and a range for a group average (3-5 can groups are recommended). It is suggested that minimum hourly checks be established for this factor so that any fill weights occurring outside the ranges set forth for individual and/or group averages may be promptly investigated and corrected.

(4) Close supervision of syrup preparation. The personnel charged with the responsibility of the syrup preparation should be thoroughly trained in the operation and maintenance of the equipment necessary for the determination of the soluble solids content of the syrup. An error of 1 degree Brix in the in-going syrup can be costly as has been previously indicated.

Brix is a true measure of soluble solids only in the case of pure sucrose solutions; however, fruit syrups contain more sugar than any other soluble constituent and the Brix measurement is a simple means of determining sugar concentration with a fairly high degree of accuracy.

A refractometer, equipped with either a Brix or refractive index scale is recommended for the determination of soluble solids or Brix due to the accuracy obtained in reading the instrument. Brix hydrometers may also be used to measure the soluble solids or Brix of syrups, and their use in the hands of competent personnel is particularly applicable in the syrup preparation room. If Brix readings are made at temperatures other than that for which either the refractometer or hydrometer has been standardized, corrections should be made for this variation.

FDA Regulations

Provisions of FDA standards for various canned fruits must be considered in controlling solids content and costs. The standards state that the saccharine ingredient from which various packing media are prepared is one of the following:

(1) sugar

(2) or any combination of sugar and dextrose in which the weight of the solids of the dextrose used is not more than ½ the weight of the solids of the sugar used;

(3) or any combination of sugar and corn syrup in which the weight of the solids of the corn syrup used is not more than 1/3 the weight of the solids of the sugar used;

(4) or any combination of sugar, dextrose, and corn syrup in which twice the weight of the solids of the dextrose used added to three times the weight of the solids of the corn syrup used is not more than the weight of the solids of the sugar used;

except that packing media prepared with the natural fruit juice are not prepared with any invert sugar syrup or with any corn syrup other than dried corn syrup.

Densities of packing media, as measured on the Brix hydrometer 15 days or more after canning, must come within the range prescribed by the

Food, Drug, and Cosmetic Act Standards of Identity for the particular product involved. Therefore, the canner must adequately control the syruping operations in order to meet these "cut-out Brix" standards.

The time interval referred to in the standards is "fifteen days or more after canning" but obviously, a canner cannot wait for such a period, or until the syrup and product of a can have reached equilibrium, to determine the "cut-out" Brix" or the product. To establish the proper degree of control, this figure should be determined within a minimum of a few hours after packing and, for this purpose, the use of the Waring, or similar type, blender is highly recommended. The entire contents of the can (excluding pits if the product is unpitted) are blended and a refractometer reading obtained on the blended mixture. The Brix reading obtained will give the canner the approximate Brix that is to be expected after the syrup and fruit have reached equilibrium. In Table 1 are presented data obtained by a California fruit packer showing a comparison of syrup cut-out to "blend" cut-out Brix of controlled packs of yellow cling peaches and Blenheim apricots.

The slight variation in the data most certainly can be attributed to experimental error, most probably due to slight variations in fruit fill weights. It will be noted that the "blend" Brix cut-out the day after packing is for all intents identical to those readings obtained 60 days after packing.

CALCULATING IN-GOING AND/OR CUT-OUT BRIX

The sugar in the canned product is a mixture of the sugar added to the can in the syrup and the sugar dissolved out of the fruit in the container. The final concentration of sugar, or cut-out Brix, therefore, depends upon four factors;

(1) The weight of fruit in the can.

(2) The percent of sugar in the raw fruit.

(3) The weight of syrup added to the can.

(4) The percent of sugar (Brix) in the syrup.

Taking into consideration the above factors, one of the California fruit canners (Stokely-Van Camp, Inc., Lodi, Calif.) developed the following formula for calculating in-going syrups and/or final cut-out Brix:

$$AB + CD = EF$$

where:

A = Weight of raw fruit
B = Percent sugar in raw fruit
C = Weight of syrup added
D = Percent sugar in syrup added
E = Total weight of fruit plus syrup
F = Percent sugar in blend, or final cut-out

The use of this formula, in which any single factor may be chosen as the unknown, depends to a great extent upon assumptions of data which should be available in the quality control records of the cannery.

To illustrate the accuracy of predicting either in-going syrup or cut-out Brix by the use of the above formula, a series of test packs of yellow cling peach slices was made in 401 x 411 cans. These data are presented in Table 2 and Figure 1.

FIGURE 1

COMPARISON OF CALCULATED AND CUT-OUT BRIX VALUES

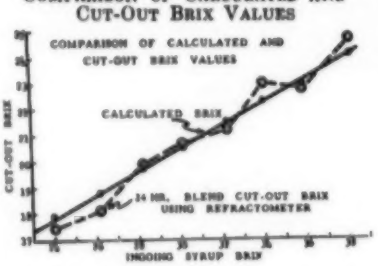


Figure 1 shows that with a constant fill weight of fruit and a constant Brix of raw fruit the calculated final Brix cut-out is essentially a straight line relationship; further, the actual final Brix of the samples follows the same straight line within the limits of experimental error. It is also found that for every 0.9° Brix increase of in-going syrup there is a corresponding increase of 0.4° of cut-out Brix.

One factor influencing final Brix cut-out, and one which is too often overlooked in the over-all picture of syrup-fruit relationship, is that of water adhering to the fruit or the container. Well drained fruit and/or cans are imperative to the maintenance of uniform, final cut-out Brix.

The drained weight of canned fruit might be classed as a function of the syrup-fruit relationship. A minimum drained weight for most fruits occurs between 12 and 24 hours after packing due to the translocation of soluble solids from the fruit into the surrounding packing medium. This period of lowest drained weight varies from one type of fruit to another, between varieties of the same fruit, as well as within any one variety, depending upon the maturity and/or soluble solids of the raw fruit. Immediately following this period of lowest drained weight there is a reversal of the flow of solids until an equilibrium is reached between the soluble solids content of the fruit and the packing medium.

Your attention is invited to the article, "Fruit Drained Weight Changes" by Dr. C. A. Weast in which it is

TABLE 1

COMPARISON OF SYRUP CUT-OUT TO BLEND CUT-OUT OF CONTROLLED PACKS. 401 x 411 CAN SIZE

	Average Syrup Cut-Out by Hydrometer	Cut-Out by Refractometer	Average Blend Cut-Out by Refractometer
Yellow Cling Peaches, Halves			
(Ave. In-going Syrup 36° Brix)			
(Ave. Fill Weight 19.0 Oz.)			
1 day after pack	21.4°	21.5°	20.1°
60 days after pack	20.3°	20.2°	20.2°
Blenheim Apricots, Halves			
(Ave. In-going Syrup 38° Brix)			
(Ave. Fill Weight 19.5 Oz.)			
1 day after pack	22.7°	22.9°	21.7°
60 days after pack	21.6°	21.7°	21.6°

Figur es shown are the average of ten (10) cans.

TABLE 2*

IN-GOING SYRUP VS. FINAL CUT-OUT BRIX

(Figures obtained on 401 x 411 cans of yellow Cling Peach Slices)

Net Wt. Fruit and Syrup	Wt. of Added Syrup	°Brix Added Syrup	Calculated Cut-Out Brix	Blend Cut-Out Brix**
31.6 Oz.	13.3 Oz.	24.	17.9	17.4
31.6	13.3	24.	17.9	17.2
31.6	13.3	26.2	18.8	18.1
31.9	13.6	26.2	18.9	19.6
31.6	13.3	28.3	19.7	19.8
31.6	13.3	28.3	19.7	19.4
31.6	13.3	30.2	20.5	20.6
31.6	13.3	30.2	20.5	20.3
32.1	13.8	32.2	21.5	21.2
32.1	13.8	32.2	21.5	21.1
32.1	13.8	34.	22.3	23.
32.1	13.8	34.	22.3	22.3
32.1	13.8	35.9	23.	22.8
31.9	13.6	35.9	23.	22.8
32.1	13.8	38.2	24.1	24.7
32.1	13.8	38.2	24.1	23.7

Net weight of raw fruit = 18.3 oz.
°Brix of raw fruit = 13.4°

*Courtesy of Stokely-Van Camp, Inc., Lodi, Calif.
**Blend cut-out Brix determined by refractometer.

shown that by plotting the change in drained weight so that time is expressed on a logarithmic basis the results show almost a straight line. It is pointed out that drained weights for different fruits can be predicted for various storage periods once a reference point of lowest drained weight has been established for each individual fruit.

Syrup Recovery System

In any discussion of syruping operations, and the savings to be realized by various factory control programs, mention must be made of the syrup recovery system. Certainly the inclusion of such a system is inherent in any well-conceived syruping operation designed for maximum syrup utilization.

A syrup recovery system consists essentially of collection traps, receiving tank, purifying, filter system, and receiving and storage tanks. Figure 2 is a diagrammatic layout of a typical syrup recovery system.

Syrup recovery may be effected at the various pieces of equipment from the syrupers to the closing machines, thus collecting that syrup which may be lost from the syruper, valves, and spillage during can travel, headspacing (paddle packers, tilt tables, etc.), and double seaming operations. In addition, that syrup dumped from syruper bowls during syrup grade change-overs is also pumped through the recovery system. The recovered syrup is cut back into make-up syrups that are in preparation.

Syruping Equipment

As was mentioned earlier, the evolution of syruping equipment occurred most rapidly in the post World War II era. This evolution has been primarily due to the most pressing problem of accurately controlling the volume of syrup placed in a container in order to conserve on the consumption of sugar.

The objective in the design of the modern syrupers today is to approach the following ideal conditions:

(1) The quantity filled should be uniformly and accurately measured.

(2) There should be no spilling or drip.

(3) The no-can, no-fill device should be incorporated.

(4) Changing can sizes should be a simple operation.

(5) The design of the machine must be such as to permit easy maintenance and adequate sanitation.

(6) All product contact parts should be of non-corrosive materials.

To point up the need for accurately controlling the headspace of the containers of fruit, let us assume the following cannery operating conditions: (1) Line speed of 150 cpm of 401 x 411 cans for an 18-hour shift, (2) use of 30° Brix syrup, (3) sugar priced at $8.45 per hundred, and (4) a reduction in headspace of 1/16" per can. The savings effected solely by controlling the headspace as above would amount to about $125.

However, due to various circumstances, many canners today have not seen fit to change their syruping equipment to precise volumetric headspace filling units.

Many types of syruping equipment are being used by the fruit canning industry today. Included are the so-called drip-line installations which depend upon tilt tables or paddle packers for headspace displacement; heavy syrup concentrate syrupers with additional water fillers to complete the fill; and other similar equipment. For the purpose of this discussion, however, let us limit our remarks on syruping equipment solely to the volumetric headspace types of syrupers.

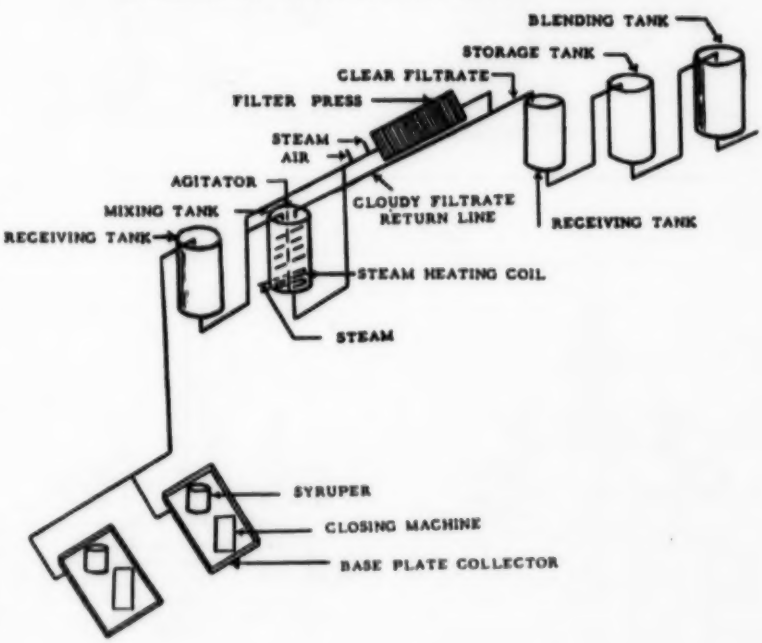
There are two basic types of volumetric headspace syrupers, namely those with the open vent or the closed vent type valves. These type valves utilize an automatic, gravity or vacuumizing type of filling in which liquid is filled or added to a product up to a pre-determined headspace level. Displacement pads of a given specific volume are incorporated on the valves, and enter the container to provide the necessary displacement for headspace control.

Figure 3 is a schematic drawing of closed and open vent valves, both valves being illustrated in closed and filling positions. There are two essential differences between the two types of valves: first, the valve seat in the closed vent valve effectively seals off both the air vent as well as the liquid vent when the valve is in the closed position. This prevents drain-back of liquid from the air vent tube into the container, or loss of liquid out of the valve onto the floor. In the open vent type valve the air vent tube is always open and it is possible to have liquid drain back into the container, thus disturbing the previously determined headspace level. Also, syrup may drain out onto the floor in the event no can is under the valve; second, the manner of venting is different between the two types of valves. In the open vent valve the venting is generally accomplished through a center vent, whereas in the closed vent valve, venting is accomplished by an offset vent. It is claimed that appreciably more efficient and more rapid venting is accomplished through the latter type vent location due to a surging action set up during the filling operation.

In Figure 4 is shown a cross-section of a gravity liquid valve (closed vent) as manufactured by Food Machinery and Chemical Corporation. In Figures 5 and 6 are shown cross-sections of another gravity liquid valve (closed vent) and a new modification of the closed vent principle, called the "Blown-Vent" liquid valve, as manufactured by Paul E. Luther Industries. With both types of valves, it is possible to make provision for different

Figure 2

Diagrammatic Layout of Syrup Recovery System



headspaces by the use of displacement shims under the can flange gasket. In the latter type valve, air pressure is employed during the closed position to blow the air vent free of liquid, theoretically speeding up the subsequent venting and filling cycle when the valve is in the open or filling position.

A major innovation in volumetric headspace syruping equipment is the Pre-Vacuumizer Syruper (PVS) developed by Continental Can Company during World War II. The PVS was originally designed to be used in conjunction with vacuum closing equipment, its main functions being to eliminate gases in the fruit tissue or entrapped air from the container, and to provide a means for attaining consistent headspace in the container. For a number of years, Continental built this equipment, but recently the PVS units have been manufactured by the Food Machinery and Chemical Corporation.

The PVS is exactly what the name implies—a pre-vacuumizer syruper. The valve, with can, travels counter clockwise around the central syrup tank and at different points vacuum, syruping, auxiliary vacuum or topping-off, and vent to atmosphere ports open and close in the valve.

Figure 7 shows the PVS valve in the four positions common to a complete pre-vacuumizing syruping cycle. Referring to Figure 7, as soon as the can is in position against the valve, the valve is opened to the vacuum line which permits the withdrawing of air or other gases which may be in the can, including some of the gases within the tissue of the fruit itself. The vacuum cycle is adjusted by the positioning of the valve actuating rollers. At the end of a preset-vacuum cycle, the finger on the valve contacts the roller which causes the valve to rotate 90° closing the can (which is still under vacuum) to the vacuum line and opening it to the syrup line. Due to the combination of gravity and the vacuum in the can, syrup then flows into the can, filling the void spaces. At the end of the main syrup operation of the cycle, the valve is again rotated 90° by a finger actuating another roller which opens the can to an auxiliary vacuum port while still open to the syrup line. This "topping-off" operation of the cycle is very

FIGURE 3

SCHEMATIC DRAWING OF CLOSED AND OPEN VENT VALVES

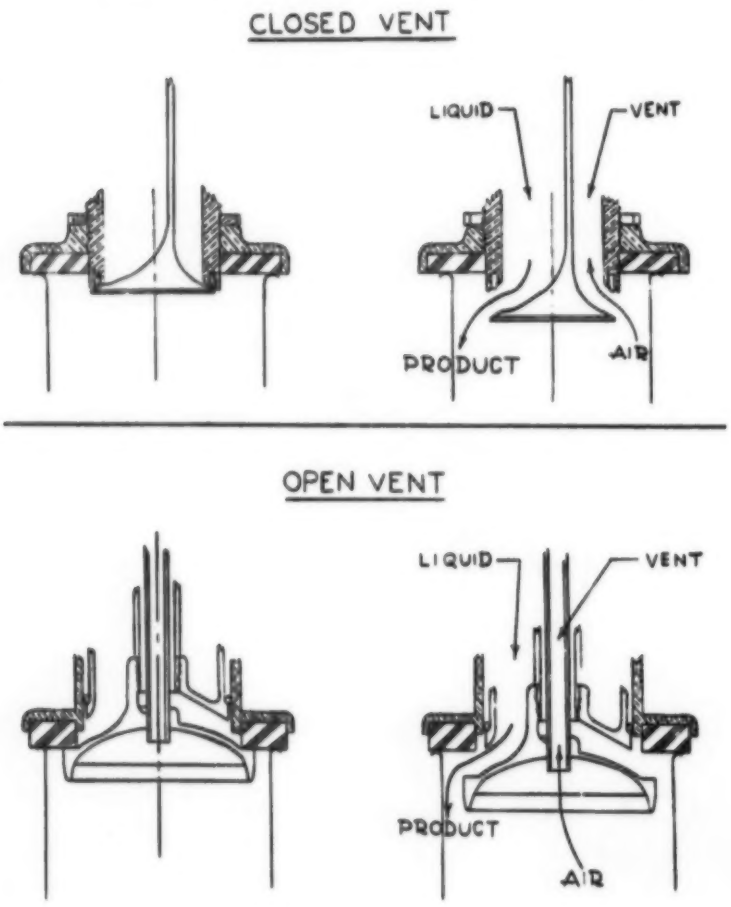
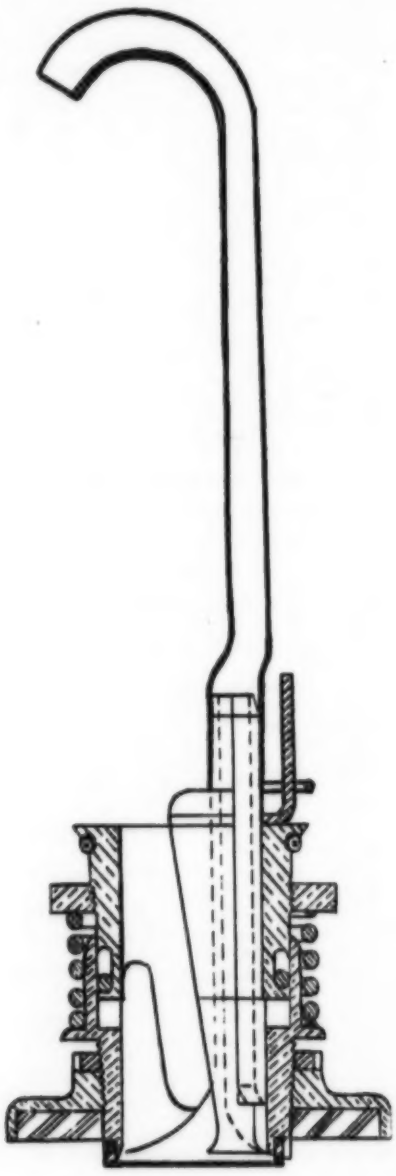


FIGURE 4

CROSS-SECTION OF GRAVITY LIQUID VALVE



short to avoid drawing excess sugar into the vacuum system, permitting only the removal of the small amount of gases that have accumulated in the headspace of the can. The valve is again rotated through 90°, closing both vacuum and syrup ports and venting the can to atmosphere. The can is then lowered from the valve and discharged from the syruper.

The PVS coupled with "Steam Vac" closure eliminates the need for the vacuum closing machine or exhaust boxes. The Steam Vac requires an adequate and uniform headspace level in the container prior to double seam-

FIGURE 5

CROSS-SECTION OF GRAVITY LIQUID VALVE

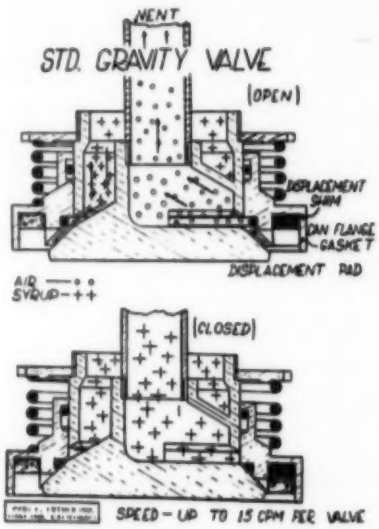


FIGURE 6

CROSS-SECTION OF BLOWN-VENT LIQUID VALVE

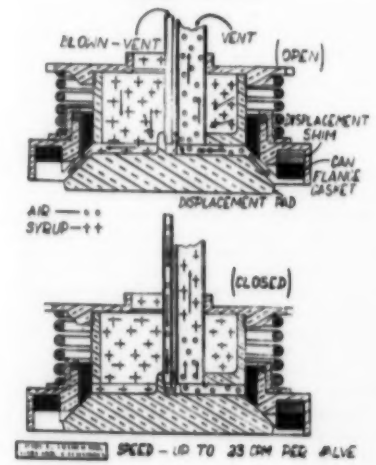
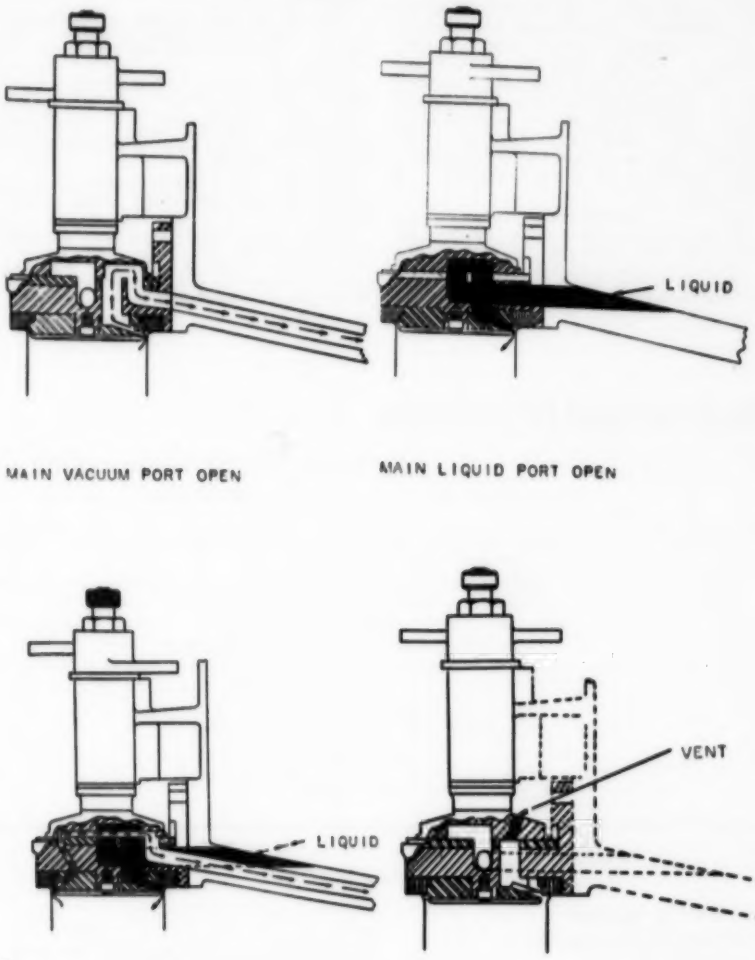


FIGURE 7

PRE-VACUUMIZING SYRUPER VALVE



ing, and failure to provide this one specification will result in erratic and unsatisfactory vacuums.

SUMMARY

Facing the canner today are the ever-increasing problems of steadily rising costs of materials, labor and equipment, in addition to compliance with federal and state regulations. One method for effecting a considerable savings is by strict adherence to a program to maintain adequate control of all syruping operations, including:

(1) accurate control of syrup concentrations in preparation of syrups for use;

(2) maintaining the proper relationship between the Brix of raw fruit and syrup and the resultant cut-out Brix;

(3) providing close supervision of fill weights of fruit;

(4) proper use and maintenance of syruper equipment, whether volumetric headspace syrupers or pre-vacuumizer syrupers are employed; and

(5) maintenance of an efficient syrup recovery system.

ACKNOWLEDGMENT

The writer wishes to express his apreciation to E. B. Cook, Stokely-Van Camp, Inc., Lodi, Calif.; Richard T. Ready, Food Machinery and Chemical Corporation, San Jose, Calif.; Paul E. Luther, Paul E. Luther Industries, Oakland, Calif.; H. C. Swab, Atlas Powder Company, San Francisco, Calif.; and to the many other individuals who have been so very cooperative in suppling information and guidance in the preparation of this paper.

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INSTRUMENTATION

(sponsored jointly by N.C.A. and C.M.&S.A.)

PRESIDING: William J. Scarlett, Minneapolis-Honeywell Regulator Co., Philadelphia

ADDRESS: "Availability of Instruments for Canners"—Wendell S. Young, The Foxboro Co., Foxboro, Mass.

ADDRESS: "Fundamentals of Measuring Systems"—A. G. Koenig, Weston Electrical Instrument Corp., Newark, N. J.

ADDRESS: "Application of Systems to Process Variables"—John E. Barber, Taylor Instrument Companies, Rochester, N. Y.

ADDRESS: "Automation and the Kitchen"—James B. Anderson, H. J. Heinz Co., Pittsburgh; and Chairman, Food Committee, Instrument Society of America

ADDRESS: "Instrumentation for a Dry Bean Line"—C. L. Fisher, General Superintendent, The Illinois Canning Co., Hoopeston, Ill.

ADDRESS: "Instruments for Control of Product Quality"—Dr. Wilbur A. Gould, Associate Professor, Ohio State University, Columbus; and Quality Control Editor, Food Packer magazine

Panel Introduction

By Wm. J. Scarlett
Minneapolis-Honeywell Regulator Co.

Maybe you have heard about the woman who was hiring a maid. Being quite well satisfied on all other qualifications she got around to asking if the maid had had experience serving at luncheons and dinners. "Oh yes," said the prospective servant, "I've had a great deal of experience and I can do it either way." "What do you mean either way?" asked the woman. "Oh, so they will accept your next invitation or not, whichever you wish." We have gotten this panel together and planned a program which we hope will be served up in such a way that you will accept our next invitation. We truly expect to provide some constructive and instructive information on the increasingly important subject of instrumentation as it applies to the canning industry.

Here on the panel are representatives of three instrument manufacturers in addition to myself. Collectively we are in daily contact with the application of instruments for the purpose of improving process operations in the work which is your major concern. We also have three representatives of the canning industry who will add the luster of their daily experiences to the discussion. It is planned that there will be two question and answer periods. One will follow the presentations of the instrument people and the other will follow the talks of the industry people.

Since this is the first time that a symposium on this subject has been planned for the canners group, those of us who had the responsibility for working up the program came to the conclusion that it would be well to begin with the fundamentals. It is our opinion that the subject matter of each participant will provide food for thought that will be extremely helpful in solving some of the planning and production problems which confront you.

Walter Judd, Congressman from Minnesota, in a recent address on the Far East and the accompanying communist threat, made the point that the time spent sharpening tools for a job is never lost. We earnestly believe that this session represents time spent in sharpening tools for the jobs that lie ahead of all of us.

As we all know, the food industry is the largest industry there is. It outranks its nearest rivals—steel and automobiles—so much that it is nearly as large as both combined. In all respects, gross dollar output, number of processing establishments, gross payroll and number of employees, it is in the Number One economic spot. It has done an outstandingly commendable job in bringing new products, new convenience foods, higher quality and better nutrition to the nation. This has been accomplished with an admirable restriction on the cost of foods as compared with other items.

How much further can we go in this respect? Competition and the public demand that we continually produce

more and better foods at lower prices in the face of continually rising costs for labor and raw materials. One means of making improvements and at the same time reducing costs may be found in the use of instruments and automatic controls. Comparisons with other industries and taking a page from their books might provide considerable enlightenment. Comparisons show that the food industry as a whole is lagging far behind in the use of instruments and automatic controls. This indicates a lack of appreciation of the advantages. There are, of course, outstanding exceptions and although the available figures do not separate canning from the other eight categories of the food industry, I'm of the opinion that canners are somewhat ahead of their brother food processors in this respect.

Of the eight major industry groups an exhaustive study has been made to determine the amount of money spent for instruments. To equitably evaluate the figures, the amount spent per year, per production employee has been determined for the nine categories of process industries. Of all the process industries, only textiles by a very narrow margin saves foods from the ignominious cellar position. In foods (all categories) the figure is less than one-third the corresponding figure for all industry. Chemicals, petroleum, metal producing, metal processing and ceramics are currently using instruments and automatic controls at rates which indicates that the appreciation of their value is from more than two to nearly eight times as great as in the foods operations. There are undoubtedly many reasons for this and we do not by any means intend to imply that all industry fits a pattern or that instruments and controls should be adopted to the same extent in all industries. It may be significant, however, that the profit statements in the industries which use these devices to the greatest extent are far more pleasant reading than those of the food industry. Only about 17.7 percent of all food processing plants make annual expenditures for process controls and less than 32 percent make even occasional investments in these invaluable aids to progress and improvements.

Population growth and general prosperity presage a continually accelerating growth pattern for the food processing industry. Present figures show that our population is currently growing at a rate of nearly five million additional persons per year. That boils down to about 14,000 per day and it means that because this is leap year the increase will be at least 13,600 more than if it weren't. Imagine that while this meeting is in session the population will increase by nearly 1,200 and of the new babies born in that time more than 600 will have a life expectancy of 65 years. That gives you an idea of how the potential market for your products is increasing.

This rapidly expanding potential market does not guarantee the individual processor a proportionate share of the business, however. All of us are confronted with a continuous battle to combat increasing costs for manpower and raw materials. Canners must face continually rougher competition not only from like products but from newcomers in the field, convenience foods and all the other products that are bidding in the market place for the consumer dollar. How do we go about meeting this ever-present challenge? What has to be done to keep our individual operations progressively more effective and above all more profitable?

In general, each of us is concerned with this problem. Its solution rests on our ability to: a) Increase production per man-hour, b) Reduce spoilage, c) Improve quality, d) Maintain uniformity, e) Increase efficiency.

Those are the same reasons that we hear so much about automation nowa-days. Hardly a day passes that this subject isn't in the headlines of the daily press and the trade journals. What is automation? The meanings conveyed to the mind of any individual are as varied as the number of individuals involved. The simplest definition is merely "to make automatic". This can be applied to a single operation, to a complete process or even to an entire factory. It is almost obvious that the problems and complexities involved in each progress geometrically in the order named. It is as surely a part of the future in the canning industry as it is already an accomplished fact in several other industries.

The automatic control of process variables is the touchstone of automation. We have set up this panel to present to you some of the basically important fundamentals of process control instrumentation. We hope to give you an understanding of the principles and methods of automatic control that will be truly helpful in your daily work. If we can accomplish our purpose, the material to be presented here will lead you to the solution of at least some of your every day problems and will greatly assist in your planning for future improvements.

An axiom of the instrument industry is that anything which can be measured can be controlled. We now have several means of measuring the common process variables such as temperature, pressure and flow. Means are available to adequately measure more difficult variables such as pH, conductivity and color. Progress is being made in measuring consistency, specific gravity, refractive index and the more difficult though equally important variables. We can ultimately expect the development of practical means of qualitatively measuring the more esthetic variables such as flavor, texture and palatability.

We don't propose at this session to go into the more complex phases of automation. The problems and considerations of making a complete process automatic require a thorough analysis of all of the factors involved. Rather than becoming involved with the highly technical considerations we are of the opinion that these discussions should be limited to a more fundamental scope. We, therefore, propose to present a more fundamental story believing that a sound basis of understanding will be most helpful to you. We believe that this approach may well lead to a continuing interest in this subject. To this end, we are prepared to proceed in subsequent meetings if it appears to be desirable to expand on the material to be presented here.

The first member of our panel is Otto C. Etterwendt, of the Weston Electrical Instrument Corporation. His subject is "Fundamentals of Measuring Systems."

The second member of our panel is Wendel S. Young of the Food Industries Division of the Foxboro Company. His talk will cover the "Availability of Instruments for Canners."

The first of the instrument manufacturer members of our panel is John E. Barber of the Application Engineering Department of Taylor Instrument Companies. His subject is "Applications of Control Systems to Process Variables."

Now we are going to hear from some of the members of the canning industry. These men face the every day problems of the production line. They will bring you stories of their experience with specific control problems and their solution.

The first of our canner members of our panel is C. L. Fisher, general superintendent of Illinois Canning Company. Mr. Fisher's subject is "Instrumentation as Applied to a Dry Bean Pack Line at Illinois Canning Co."

"Instruments for Control of Product Quality" is the subject to be presented by Dr. Wilbur A. Gould. Dr. Gould has had considerable experience with Ohio canners and is a professor at Ohio State University. He is also quality control editor of *Food Packer* magazine.

"Automation and the Kitchen" is our next subject to be presented by James B. Anderson. Mr. Anderson is a department head in the Research Engineering Department, H. J. Heinz Company and also, Chairman of the subcommittee on Foods, of the D-7 Committee on Instrumentation for the process industries of the Instrument Society of America.

Fundamentals of Temperature Measuring Systems

By A. G. Koenig,
Weston Electrical
Instrument Corp.

In presenting the fundamentals of temperature measuring systems, a short foreword on the development of modern thermometry would, I believe, be of interest.

Temperature may be defined as the condition of a body which determines the transfer of heat to or from other bodies.

In the science of temperature measurement, thermometry, the most important requirement is the ability of the measuring device to always indicate the same values at the same temperatures. Galileo's thermometer was probably the earliest scientific approach to the problem of temperature measurement, but it was inadequate primarily because it used the effect of the expansion of air in a bulb upon a column of liquid in a tube, and variations of atmospheric pressure on the open column introduced errors which could not be compensated for.

In the early 1600's liquid-in-glass thermomenters were developed by the Grand Duke Ferdinand of Tuscany. These eliminated the errors caused by atmospheric pressure changes, but the temperature indications were difficult to interpret because the scale was marked to represent thousandths of the bulb volume.

In 1701 Sir Isaac Newton created a scale in which the freezing point of water was 0 and body temperature was 12. Later in the 1700's Gabriel Fahrenheit marked a mercury thermometer scale with 0 at the point reached in an ice-salt bath and with 12 degrees as blood temperature. Later, to obtain finer indication and more divisions, the scale was changed to 0 to 96° in which 0 was the salt-ice temperature, 32° was the freezing point of pure water, and 96° was body temperature. Subsequently the body temperature mark was corrected to 98.6° and 212° was added as the boiling point of water.

Still later in the 18th century Reamur laid out a scale of 0 to 80° R. corresponding to 32 to 212° F., and Celsius produced his Centigrade scale in which 0 is the temperature of melting ice and 100 the temperature of boiling water.

In 1858 Lord Kelvin conceived a new scale starting at absolute 0 (at which it is assumed that all molecular motion ceases) or −273 C. and advancing in steps equal to the Centigrade degree. Thus −273 C. = 0 K and 100 C. = 373 K.

Today the Fahrenheit scale is widely used in English-speaking countries with the Centigrade scale used in scientific work, and generally in chemical industries.

Any temperature measuring device only measures temperature at the point at which the sensing element is located. Generally, it cannot correct for temperature gradients which may be present in a wide area. Therefore, care must be exercised in the location of the temperature sensing element.

For best results the temperature measuring system selected should be the one which responds to variations of temperature as quickly as possible.

There are four basic types of temperature measuring systems. Each has its limitations as will be brought out later.

(1) All glass thermometers

(2) Bimetallic types

(3) Pressure system types

(4) Potentiometric or resistance thermometer types

Glass Thermometers

Liquid-in-glass thermometers operate fundamentally on the difference in rates of expansion of liquid and glass to temperature changes. Mercury and alcohol have high coefficients of expansion. Glass has a relatively low coefficient. The higher rate of expansion of the liquid forces it up the thermometer stem as the temperature is raised. It is still considered a final form of check thermometer and is used extensively in the process industries.

The temperature sensing element is usually enclosed in metal and surrounded by a good heat transferring agent. While mercury is generally used as the heat sensitive measuring medium of the thermometer, some thermometers are made which use colored inorganic liquids as the heat sensitive medium. Several types of glass with colored light shields are available for easier reading. Mercury thermometers cover the general scale range from −40° to 1000° F.

Bimetal Thermometers

The bimetal thermometer functions in a similar manner to the mercury in-glass on the principle of the different rates of expansion of two metals. In recent years with the remarkable development in the nickel alloy field, an alloy called Invar was produced. At normal atmospheric temperatures this alloy neither expanded nor contracted and its length was invariable. Further developments in this field produced a nickle alloy of an opposite characteristic, that is, a high and consistent rate of expansion under increased temperatures. These two metals, when welded together and rolled to proper thickness, will bend sufficiently under temperature changes to have a usable sensitivity as a thermometer. By improved production methods the two elements combined in the final strip of bimetal, no matter how thick, are perfectly bonded and mechanically inseparable.

When a straight bimetallic strip fastened at one end is heated, it bends to form an arc or circle with the high expansive metal on the outside and the low expansive metal on the inside. This bending or curvature, by a suitable mechanical system and scale can be used to indicate temperature. Obviously, the greater the bending effect for a given temperature change, the more sensitive the temperature indication. This bimetal is wound in the form of a helix or series of helices wound coaxially one within the other. The bimetal element is normally anchored at the bottom of the stem and transmits rotary motion to the pointer by means of a straight one-piece stainless steel shaft. No gears or levers or other amplifying linkages are required. The bimetal thermometer is not subject to emergent stem corrections as is the glass thermometer.

Pressure Type Systems

The pressure system type of measuring element is usually used for distant reading. Each of the several types enumerated have dissimilar characteristics. The knowledge of the characteristics of the several forms is helpful in considering the selection of a particular type of measuring element. The pressure type systems consist of:

(1) Mercury actuated

(2) Vapor pressure actuated

(3) Gas actuated

(4) Liquid filled actuated

Mercury Actuated Systems

In mercury filled thermal systems the expanding medium is mercury. Systems of this type are solid filled and develop a great actuating force. Characteristically they have a high speed of response and a high degree of accuracy. Mercury systems cover the temperature span of −38° to 1000° F. Short temperature spans (as short as 50° F.) may be selected. With the exception of the spiral or spring, which is specially heat treated steel alloy, the entire thermal system is usually made of steel.

Case compensation is sufficient only when there are no wide ambient fluctuations and where only short lengths of tubing are involved. Otherwise complete capillary and case compensation are necessary. Capillary com-

pensation is accomplished by means of a second spiral whose system extends all the way to the bulb. The measuring and compensating spirals expand in opposite directions and are interconnected. Therefore, a change in temperature within the instrument case or at points along the capillary tubing will affect both actuating spirals by the same amount and the results will exactly neutralize each other.

The bulb size is definitely restricted and is governed by the temperature range. Short ranges require longer lengths of sensitive bulbs and wide ranges a shorter length. The temperature sensing element may be called an averaging temperature element since it responds to the average temperature change along its sensitive length.

Vapor Pressure Actuated Systems

Vapor filled thermal systems operate on the general principle of all filled systems, namely, that fluids tend to expand when heated. When the fluid vaporizes and if it is confined, an internal pressure will be built up in the system which is in definite relation to the temperature being measured. In an industrial-type thermometer a cylindrically shaped metal bulb (sensing element) is immersed in the medium whose temperature is being measured. Internal pressure developed at the free surface of the liquid in the bulb tends to uncoil the pressure element (Bourdon tube). The movement of the pressure element moves a pointer across a calibrated scale; in the case of a recording thermometer, a pen across a calibrated chart. There always is liquid and a vapor space in the bulb.

Vapor pressure actuated temperature measuring instruments are most effective and satisfactory within certain definite temperature ranges without too much restriction as to the maximum length of tubing between the temperature sensing element and the instrument case. They have definite temperature range restrictions with an approximate medium temperature of 500° F. Vapor pressure actuated systems require the use of progressive scale temperature dials or charts—a temperature scale on which for equal increments of temperature the spacing of the graduations become progressively larger from the low to the high point of the range. By careful selection, it is possible to select a dial or chart on which the average operating temperature is located in the area where the graduations are spread the widest. Vapor pressure instruments can be made with small temperature sensing elements of practically any metal. In calibrating, the vapor actuated sensitive element can be made to respond to either the highest or lowest temperature along the sensing element. Inaccuracies will result when the case and sensing elements are at the same temperature (ambient) unless the system is especially filled to overcome this condition. Bulb elevation is important and is considered in the calibration of the instrument.

Gas Actuated Systems

Gas filled thermal systems utilize an inert gas as the expanding medium. Thermometers of this type are the industrial counterpart of the extremely reliable and accurate laboratory type gas thermometer. This system operates according to Charles' Law that "with a fixed volume of gas, the absolute pressure change is in direct proportion to the absolute temperature change." Practically constant volume conditions are attained in the industrial type through proper design of spiral and bulb. The bulbs of gas filled thermometers are generally larger (greater capacity) than for other fillings. This also minimizes the effect of ambient temperature variation throughout the length of the connecting tubing. With the volume of the bulb many times that of the capillary tubing, the effects of ambient conditions are usually negligible. Ambient temperature changes at the case of the instrument are compensated by a bimetallic strip, the action of which is integrally tied in with the movement of the spiral to counteract the effect of any temperature change at the case.

Gas filled instruments have a uniformly divided scale or chart.

Liquid Filled Systems

In this type of actuation, the complete system (bulb, capillary and spiral) is solidly filled with a liquid which expands and contracts in proportion to the change of temperature. Due to the relatively high coefficient of expansion of the liquid, ambient temperature variations must be counteracted. Fully compensated systems must be used when the connecting tube length exceeds ten feet. Ranges may be selected below the freezing point of mercury (−100° F. to +500° F.). Short ranges are desirable; in fact, ranges of more than 250° F. span are not desirable. Small bulbs may be used and bulb material may be of non-ferrous metal.

Mercury, gas and liquid filled systems have a uniformly divided scale whereas vapor filled system scales are progressive.

Pressure type systems are widely used and have been developed to a high state of fine measurement. Constant development is being pursued to meet the more exacting conditions of industrial requirements.

Potentiometric or Resistance Type Thermometers

Resistance and thermocouple types of temperature measuring systems are not in general use in the canning industry. Distance limitations without the use of auxiliary transmitting devices are less severe than for the filled system types.

Thermocouple Types

When two dissimilar metals are joined together at one end and this junction is heated, a voltage is developed in the free ends proportional to the difference in temperature between the heated junction and the reference (free) junction. In modern practice the two free ends are connected to a millivoltmeter or potentiometer which measures the voltage created and indicates or records this voltage in terms of temperature. Instruments of this type are commonly known as thermocouple pyrometers.

Resistance Type Thermometers

The resistance thermometer is being widely used in industry although as yet it has found only limited use in the canning plant. The property of metals to increase in electrical resistance with increasing temperature provides a method of temperature measurement known as resistance thermometry. The detecting element takes the form of a wire-wound resistor commonly referred to as a resistance thermometer bulb. The bulb is connected to a measuring instrument incorporating a Wheatstone bridge. Simple indicating thermometers employ a deflectional bridge, whereas recorders and controllers employ a balanced bridge. All of these instruments interpret changes in resistance at the thermometer bulb in terms of temperature.

Application of Systems to Process Variables

By John E. Barber,
Taylor Instrument Companies

Fundamental principles upon which process variables are measured, as discussed by Mr. Koenig, although not limited for all time to those now employed, are limited to a relatively small number. As pointed out by Mr. Young, a great many more instruments are available than fundamental principles upon which they work. When considering the application of these principles and the instruments employing them to the control of process variables, it must be realized at the outset that the possible number is practically limitless.

Therefore, since we cannot cover all applications and cannot even scratch the surface in this brief session, let

us consider primarily problems which are common to all applications.

It should be clear that the range of detail of the problems is great. A comparison of the complexity of applying a simple temperature controller to a steam cook retort with that of applying a completely automatic retort control system usable for either water or steam cooks indicates immediately that instrument application problems vary greatly. A common ground for the solution of the simple and the difficult must be established.

To solve any problem one must understand it. In the solution of an instrument application problem one must understand: (1) the nature of the process and its characteristics, (2) what processing equipment is employed and what, if any, are its peculiarities, (3) what end results are desired of the control system, and (4) what given instrumentation can do on a given problem.

Let's examine a simple problem and see how it was solved. Most of you are familiar with the dual or zone control system used on a rotary blancher. Why is this particular system successful? Let's build it up a step at a time.

What is the process and what are its characteristics? The problem is one of heating. The product is immersed in water which should be held at a predetermined temperature by direct steam injection. Product inlet temperatures vary somewhat. Product flow rates can vary appreciably and rapidly. What are the maximum product flow rate and product heating load? Steam supply pressure is another variable.

What processing equipment is employed and what, if any, are its peculiarities? We have already said it's a rotary blancher. This implies agitation of the water, hence no stratification. How long is the machine? What is the normal water level and what is its volume? Since direct steam injection is used, what is the distributor design? What is the allowable warm-up time prior to product admission?

What end results are desired of the control system? This is simple on this job. Control within ± 2° F. is required regardless of fluctuations in load.

What can given instrumentation do on a given problem? Here's the rub! Instrument knowledge is essential. Let's momentarily assume we have this knowledge, carefully re-examine the over-all problem and see what conclusions we can draw.

Agitation of the water is in our favor since water near the top will be at nearly the same temperature as that at the bottom.

Length of the unit may be against us. If it's 3 feet long, the temperature gradient wouldn't be great from inlet end to outlet end if we supplied steam to a single distributor. If it's 20 feet long such is not the case. The outlet temperature would be much greater than the inlet, assuming uniform steam admission throughout the distributor.

Hence, why not "shape" the steam distributor so that less steam is admitted at the product outlet end? This, of course, makes sense at only one specific heating load. Therefore, the approach is to use zone or dual control. Split the blancher into two parts. Use two steam distribution systems and controllers. The inlet end carries the heavy load. With it, changes in product flow rate are quickly sensed and corrective action initiated. The outlet end carries the lighter load since most heating is done in the inlet. The heating load changes, for which the outlet end distribution and control system must correct are comparatively small. Without zone control on a long blancher it is not possible to reach the desired end results.

What about the control system? We must select diaphragm valves of proper size and action. This problem is beyond the scope of this discussion.

We want to measure temperature so we must select a range, and an element which will contribute to a workable system. What about range? Make it large enough to cover desired set points, narrow enough to provide readability and rugged enough to withstand overranges to which it may be subjected. A range of 100-200° F. meets these requirements.

Standard vapor tube systems with bulbs installed through the ends of the blancher will work well. A word of caution: on most applications considerable care must be taken in locating the sensing element. For example: on any type of measurement involving sampling, attention must be given to obtaining a representative sample and doing so without introducing excessive lag in rate of sample change. Unfortunately, temperature sensitive elements assuredly have been and probably others will be installed improperly. Let's look at the problem at hand. Assuming we do have good agitation of the water, it doesn't look as if we could get into trouble. However, we all can understand that the main steam inlet lines will be hotter than the water. Likewise, close to holes in the distributor pipe it may be slightly hotter than the bulk of the water. Hence, we can see that to get representative temperature readings we should not locate a temperature sensitive element too close to a source of heat.

We now come to the problem of controller selection. Should it be blind, indicating or recording? It should not be blind if it is desirable to have ease of set point adjustment. The decision between indicating or recording is simple. Proof of proper processing may be helpful or mandatory. In either case, recorders should be used.

What control response or responses should be incorporated in the controllers? Five types of controllers are available. They are on-off, proportional response, proportional plus reset, proportional plus derivative and proportional plus reset plus derivative. Which should be used on this job? Experience shows that a proportional response controller provides the best solution for blancher control. Can we arrive at this same conclusion by examination of the process and processing equipment? Surely we can by using either reaction rate curves or frequency response analysis. However, we can also do it reasonably accurately if we know the characteristics of the various instrument forms.

An on-off controller will cause the control valve to stroke fully due to a very small temperature change. A slight increase will close the valve, in this case, and a slight decrease will open the valve. Though we have a reasonable volume of water in the blancher, we must remember then we can admit a considerable amount of steam in a short time so that we can correctly presume that the water temperature would cycle with an on-off controller.

A proportional response controller may be adjusted so that it will cause the valve to stroke fully due to a predetermined temperature change. This is adjustable so that the controller can be set to cause full stroking of the valve for that temperature change which will give stability of control whether it turns out to be 1° F. or 100° F. It would be set on the job so that a given temperature change would cause sufficient corrective action of the valve without throwing the control system into a cycle.

The controller sensitivity, which means the instrument output air pressure change per inch of pen travel, would be quite high on this job because of the relatively large volume of water in the blancher and because of the relatively low rate at which the water temperature could be raised for a given increase in valve opening.

On this job load changes can be caused by changes in product flow rate, product inlet temperature and steam supply pressure. Load changes call for different valve openings. To get a change in valve opening, the controller output air pressure must change. With a proportional response controller it is inherent that offset, deviation between set pointer and indicating pointer or pen, must occur to cause an output pressure change. The magnitude of offset is directly proportional to the sensitivity setting and the size of the load change.

Remembering that we predicted a high sensitivity setting, we know that though load changes will cause limited offset, the offset will not be great enough to preclude maintenance of the process variable within the prescribed limits.

What if the water volume had been small and the rate at which we could change the water temperature had been large? This would indicate that the controller sensitivity would be low and we would not be able to hold the temperature within the prescribed limits with a proportional response controller. Automatic reset would have to be added to the controller to eliminate the offset.

In conclusion, we have examined a relatively simple process and have been able to instrument it properly only by careful consideration of the process, processing equipment, desired controlled results and the characteristics of available instrumentation. Whether the control problem is a simple one or one of great difficulty or complexity, the same building blocks toward the solution must be employed.

Automation and the Kitchen

By J. B. Anderson,
H. J. Heinz Co.

In the transition of the manufacturing of food from the home kitchen to the commercial kitchen, a steady application of scientific and technical principles has relentlessly changed the process of preparing food for the family table from an art to a science; from an individual act of production to mass production; and from physical and mental effort to mechanical and technical effort; all of which adds up to making use of the old techniques newly called automation. Automation may well be defined as a substitution of scientific devices for human decision and endeavor. Automation is a new word which describes old techniques practiced for many generations back to the stone age in which man has made an effort to better his station in life by substituting devices which are capable of matching and often exceeding his own mental and physical efforts.

Basically, we consider the food industry a process industry in which a combination of manual and mechanical functions results in the processing of raw materials in such a way as to supply a safe appetizing food of high quality and reasonable cost which can be stored and distributed to the families of the world. As the American housewife has made great strides in applying the principles of automation to her private kitchen as evidenced by the sparkling array of gadgets in most modern houses, so has the food manufacturer made use of scientific principles to improve his position both from a competitive and a quality standpoint.

The major reasons for applying the principles of automatic control are

(1) Increase of quality.

(2) Reduction of manufacturing costs.

(3) As a substitute for unavailable manpower.

As concerns quality, the ability of mechanical, electrical, electronic, pneumatic and hydraulic devices to function repeatably without deviation and fatigue often makes them superior to manual and mental functions. Thus manufacturers find that by relying on automatic controls for flow, pressure, temperature, rate of feed, weight, ingredient ratios, and many other functions they are able to consistently produce a product of uniform quality, enabling them to place the maximum portion of their pack in the quality range desired.

I believe a simple illustration of this would be illustrated by the control of temperature of a liquid material being heated in a heat exchanger. A temperature controller can be installed which is on the job every second of the day without requiring the breaks needed by man and capable of continuous alertness without distraction or fatigue. Mechanical components can be built into such an instrument enabling it to repeatably sense and mathematically correct for variances in a manner beyond the consistent capabilities of an operator.

The reduction of manufacturing costs can stem from several different sources. The most common reduction is through savings in direct labor although savings may also result from elimination of ingredient waste, maintenance, replacement costs, or even in capital investment. A happy circumstance occurs when operating savings can be made with a lower capital investment on buildings and equipment, a condition which is not too uncommon.

There are, in addition to the two major advantages mentioned, further advantages brought about by the unique operations of many food packers due to the seasonal nature of many of the operations. The requirement for large amounts of manpower in localized areas for short periods of time places tremendous strain on recruiting programs and often becomes an almost impossible obstacle to overcome. Many of the manufacturing processes, while generally composed of rather homely operations, still require considerable ingenuity on the part of the operating personnel, a fact which I am sure will be confirmed by the average housewife, and the obtaining of personnel having the desired qualifications presents another problem.

As a further comment on the third item—as a substitute for unavailable manpower—such a trend appears required for future operations in view of the increased standard of living and the accompanying increase in demand of manufactured items when compared with the potential increase in the labor supply. If we do not follow such a path of converting to automatic methods, we may find the continued improvement of our standard of living curtailed.

It will be observed that the previous discussion has been on a rather broad basis. Mentioning that automation includes mechanical techniques indicates that its scope is tremendously large. Every machine used by the food manufacturer presents advantages which fall under the basic definition of automation. Automatic labelers are a good example of such an application, as is a continuous sterilizer, a tubular heat exchanger, an evaporator or any other of the highly mechanized pieces of equipment which have long functioned as necessary aids to production. The scope of this paper cannot be sufficient to cover these many different phases of automation but will be limited to consideration of the part that automatic control can play in making a process more completely automated. In fact, it is often the ability of these instruments to control the working unit that makes this unit a possibility.

The extent to which the technology of instrumentation can be applied by the manufacturers of food products covers a tremendous range from simple to complex. The basic components of any automatic control application generally fall into the following categories:

(1) The sensing element.

(2) A relay.

(3) A controlling element.

To these basic steps can be added many mathematical functions provided for a multitude of responses initiated by the sensing element, such as the applications of derivative, adjustable proportional band and reset. Accessories as needed for recording, integrating, etc. are readily added. One of the simplest applications is exemplified by the use of an ordinary thermometer which senses and indicates a temperature. This sensing can be elaborated upon by adding a recording chart, and a relay which can be used for control purposes. The relay output can incorporate mathematical functions in such a way to compensate for such variables as load change, sensitivity, process lag, and many other possible challenges to straight line control. A more complicated installation of instrumentation is illustrated by the controls of high

temperature short-time sterilizing systems which not only control time, temperature, flow rate, deaeration of the product, but also operate diversion valves to protect against material which is not properly processed, simultaneously giving a complete record of all that is happening. Automatic control of tomato pulp evaporators is well established and illustrates a complex system of control involving liquid levels, absolute pressure, steam pressure, water flow and pulp density, and each of these various control elements is contingent upon the efficient operation of the other controls. This is an example of control application which made possible extended time operations of tomato evaporators in a process, which was impossible previous to the development of proper instrumentation.

The development of liquid and dry ingredient feeders which make use of many of the basic principles of instrumentation have made possible fully integrated blending systems. One major manufacturer has a major installation in which each of a number of ingredients is fed in accordance with the recipe and the rate of operation is altered by merely changing the rate of the master pacing unit. Each feeder can be individually adjusted to change the recipe, but once set, the unit always feeds the correct ingredient ratios regardless of rate of operation. This manufacturer has in operation a true "push button" factory as far as his "making" function is concerned.

In general the food industry is behind some of the other process industries, such as the petroleum and chemical industries, in these applications, but there are many examples where these principles can be used advantageously and rather extensive installations have been made. We know of one installation in England in which a continuous bean blancher is automatic to the point of readjusting the entire system depending on how many filling lines are operating. This installation also makes use of miniature components in a graphic panel.

As mentioned above, the food industry is generally behind the chemical and petroleum industry in regard to applications of instrumentation. This does not imply that the food industry is any less progressive, but more likely confirms the fact that in many cases food industry techniques are not entirely suitable for application to principles of instrumentation. Part of the difficulty is the lack of uniformity of raw material, a factor which may become more under control as the agronomists develop better breeding lines. The ultimate will be when they develop cubical fruits and vegetables without any flaws. Additional difficulties are presented by the seasonal nature of many of the operations which makes it difficult to amortize the high capital cost of automatic process equipment over a short period of operation time. However, I have no doubt that if we had opportunity to operate for 12 months a year on many of our products, the food industry would be as fully automatic as are the chemical and petroleum industries. The question of the degree of pay-off required on an installation is one to be decided by each individual management group, and conditions often dictate whether one, two, three, or four-year payoffs are justifiable. In some industries new projects which will not pay themselves off in less than a year are discouraged, not because a four-year rate of investment is not satisfactory, but because top management feels that there are plenty of places to invest the money where the return will be in a one-year period.

Sometimes management is pleasantly surprised by discovering an economic advantage they did not originally anticipate but which was the result of improved manufacturing technique. One difficulty that presents itself is the rather common occurrence in which half-way measures will extract most of the savings, making it impossible to justify the balance. As an example, conditions may exist whereby completely automatic installation makes a certain savings but going part way and making half the investment will result in three-fourths of the savings and it will never be practical to justify spending the other half of the investment to pick up the other 25 percent in savings. Thus, the desire for fast payoff may result in inability to pick up the full savings available. Even more important though, it is essential to guard against investing in equipment which may be temporarily expedient and economical, but which blocks progress in the long range planning because it does not fit in the master plan and has already taken some of the savings.

As far as the future is concerned, I can only speculate and base my speculations on trends I have observed in the food industry and other industries. Many industries are able to justify a rapid changeover to the most complicated methods of control, including graphic panels, miniature components, data reduction systems, etc.; but for the manufacturing end of the food industry I can see continued steady advances in the applications of the principles of instrumentation and a gradual evolution toward the performing of many of the manufacturing functions by technological methods. As advances are made in control of raw materials and as process procedures become more and more of a science instead of an art, it appears that the food industry will inevitably proceed to the "push buttom" factory which will result in better products at lower costs. I am convinced that the future will find that the food industry has one of the greatest potentials in the application of technological developments.

Instrumentation for a Dry Bean Line

By C. L. Fisher
The Illinois Canning Co.

The correct use of instruments throughout the canning industry, whether it deals with the processing of fresh fruits and vegetables, dry-soaked products, or frozen foods, is highly recommended by all leading laboratories, and the over-all result of such instrumentation is basically important as well as universally acceptable to the canning industry.

We should not make a comparison of the results obtained by the use of manually-operated devices, with results obtained by the use of fully automatic instruments, since they are not in the same category. When the human element enters into such an operation, it is entirely possible to produce disastrous results at times, while, on the other hand, fully automatic instruments in good working condition are practically infallible.

Having been actively associated with my company for the past 34 years in the processing of fresh vegetables in season, and dry-soaked beans on a year-round basis, I naturally would realize the importance of instrumentation in the packing of those items; also the progress which has been made by instrument manufacturers over that period of time.

In all fairness to the various manufacturers of the instruments which are being used in our plants, the writer will refrain from mentioning the manufacturers' names, thereby taking a strictly neutral position in the case, since the fundamental duty of each instrument is basically identical, regardless of trade name.

As soon as a carload of dry raw beans arrives at the plant, a composite sample of numerous bags is taken, a sample which we consider will represent a fairly accurate cross-section of the entire car.

By the use of a well-known moisture tester in our laboratory, we are able to determine the exact moisture of that sample, and in case this particular car is not to be processed immediately, it is segregated in the warehouse, or is stored with other cars of a similar moisture content.

An accurate record of the location of each car and its moisture content is maintained at all times, so that an intelligent calculation can be made as to the necessary soaking time and temperature of the water when that particular car is to be processed.

Special length thermometers are provided to determine the temperature of the water at the time of soaking;

that temperature, coupled with the initial moisture content of the raw beans, enables us to determine the proper soaking time under those conditions, bearing in mind the importance of a properly soaked bean, since we fully realize that an over-soaked bean produces a "mushy" condition after process, while an under-soaked bean is entirely too firm in texture, and due to the fact that it has not reached a fully swelled stage, it becomes extremely difficult to obtain the correct fill-in weight at the time of fill.

To complicate the matter further, an under-soaked bean has a tendency to absorb an extra amount of sauce while finishing its normal "swell" during process, thereby leaving the product not completely submerged in its sauce, and quite often causes a slight discoloration of the beans which are not totally submerged. For this reason, it is extremely important that we make use of accurate, dependable instruments in the hands of supervisors who fully realize the necessity of a proper soak of dry, raw beans.

The principal dry bean items processed in our plants consist of light and dark red kidneys, the small round chili beans, navy beans, Great Northern beans, and the California large limas, each having a peculiarity of its own, which requires certain changes in the method of handling each item, including a different soak, fill-in weight, and process time, in order to produce a satisfactory finished product.

As soon as the fully soaked bean is drawn from the tank into the flume, hydro-lift pumps, using mechanical liquid-level controls, pump the product in suspension to the head of the process line, where the beans are separated from the liquid along with splits and skins which are carried back to the sewer for removal later to a waste pit located a considerable distance from the plant.

As soon as separation is completed, the beans fall by gravity into the rotary blancher where the temperature of the water is uniformly controlled by diaphragm valves which are actuated by thermometers located within the blancher. These instruments maintain a uniform temperature at all times, which does not vary in excess of two degrees, plus or minus. A complete record of all temperatures used throughout the day is written by a recording temperature controller. High sensitivity of the instrument permits an extremely accurate control of the blanching water at all times. The product is then spread evenly over a long inspection belt by means of a mechanical shaker-washer which removes additional splits and skins. Ten lady inspectors are stationed at each belt to remove off-color beans, and any foreign object. We are considering at this time the installation of certain electric devices which will automatically reject any off-color objects passing over the belt.

As soon as inspection is completed, the product is passed into the hopper of hydro-lift pumps which elevate the beans to mezzanine level on to vibrating screens where additional splits and skins are removed. Temperature of the water, which moves the product in suspension to the upper level, is maintained uniformly by air-operated temperature regulators in order to provide proper closing temperature.

High-speed fillers, operating at 300 to 350 cans per minute, now receive the product, and accurately measured quantities of raw beans are mixed with syrup or sauce, whose temperature is held at 190° F. by means of a final temperature regulator.

Electric canners' hoists now place the crates of filled cans into vertical retorts, where final processing operation is accomplished by means of automatic pressure and temperature controls.

After cooling, the crates are unloaded by mechanical unloaders, elevated, and sent to the warehouse on the overhead cable system. When we consider that we are now processing approximately 90,000 pounds of raw beans in an eight-hour working day with the assistance of the various instruments and controls which I have just mentioned, let us imagine how helpless we would be if we were to be deprived of the use of automatic controls and the practical application of instrumentation.

Instruments for Control of Product Quality

By Dr. Wilbur A. Gould,
Ohio State University

Quality control instruments provide plant management with an objective appraisal of product quality. Not only is the appraisal objective, but quality is described in terms of numbers. With industry standards based on quality determined through the use of instruments, management has an objective index of quality hour by hour, day by day, and year by year. Instrumentation for control of product quality means a tremendous forward step in the successful operation of canning factories. Further, it means control of product quality at predetermined desired levels of quality.

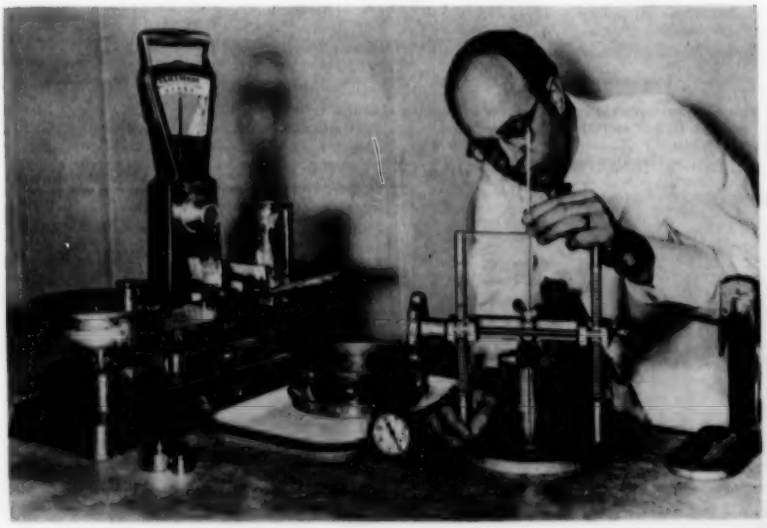
Before describing instruments for control of product quality, I would like to mention three salient points that must be provided by plant management. These are:

(1) A quality control laboratory properly equipped to carry out basic quality control procedures;

(2) A Food Technologist who understands (a) how to obtain representative samples of the raw product, the product during processing, and the finished product; (b) laboratory

FIGURE 1

CAN OPENER, CENTER TEMPERATURE MEASURING DEVICE, VACUUM GAUGE, GRADING TRAYS, DRAINED WEIGHT SCREENS AND SCALE



and instrument techniques, and (c) the interpretation of the quality data obtained; and

(3) A desire and understanding by management for information on quality and what to do with this information to control product quality at desired levels.

Quality may be defined as "the combination of attributes (or characteristics) of a product that have significance in determining the degree of acceptability of the product to a user" (1). If all the attributes of quality could be evaluated from data obtained through the use of instruments and appropriate standards of quality established, the quality of canned products could be maintained or controlled at the desired degree or degrees of acceptability.

Laboratory instruments for control of product quality are generally specific for the various products. They are commonly referred to as the "destructive sampling type instruments." Before discussing these, let's look at some of the basic laboratory instruments needed by any Quality Control Technologist. The first essential instruments are shown in Figure 1. These include center temperature measuring device, vacuum gauge, drained weight screens (2 and 8 mesh), an accurate scale and size grading screens. The application and need for these instruments is quite evident. However, let's take one example—drained weight. For canned tomatoes the U. S. Standard for Grades have specific values as shown in Table 1 for the various qualities. If a tomato canner is attempting to pack Grade A tomatoes he must have, among other factors of quality, 13½ ounces for a No. 2 size can of tomatoes. If his product has a drained weight of 12 ounces, it is Grade B quality, etc.

Most canned products require the can to be filled to 90 percent of the container. Therefore, when examining a product, the Quality Control Technologist would use a headspace gauge and measure headspace and record it. Table 2 gives the maximum headspace allowable to comply with this 90 percent tolerance for various sizes of cans (8).

Hydrometers are specific for various solutions and can be obtained to evaluate salt content for brines; various chemicals, such as, percent alcohol as used for determining AIS; as well as sirups used when packing fruits.

The succulometer, steinlite, texturometer, Adams consistometer, Bostwick consistometer, and refractometer are specific instruments used to evaluate specific attributes of quality. A one-line packers' Quality Control Department obviously would want one of these instruments for the control of quality of his specific commodity. They find their place in the operation for determining the maturity of the raw crop or the evaluation of a specific process variable. Let's take a specific example, the succulometer. It has been used to evaluate the maturity of raw corn, or the maturity of the finished product. Figure 2 shows specific data collected by Crawford to illustrate the place of sampling of whole kernel yellow corn and the value obtained for specific raw corn maturity levels as classified by the U. S. Department of Agriculture (2). It can be seen from these data that an error may be introduced in judging maturity levels of corn depending on where the sample was obtained.

TABLE II

HEADSPACE TOLERANCES FOR VARIOUS SIZES OF CANS

Can Make	Can Maker's Description	Maximum Gross Headspace Allowable*
8Z Short	211 x 300	7.2
No. 1 Picnic	211 x 400	8.8
No. 300	300 x 407	9.5
No. 303	303 x 406	9.4
No. 2	307 x 409	9.7
No. 2½	401 x 411	9.9
No. 3 Vacuum	404 x 307	7.9
No. 3 Cylinder	404 x 700	13.6
No. 10	603 x 700	13.6

*in 16ths of an inch.

FIGURE 2

AVERAGE SUCCULOMETER VALUES FOR WHOLE KERNEL YELLOW SWEET CORN DURING 1953 AND 1954 FOR THREE RAW PRODUCT MATURITY CLASSES

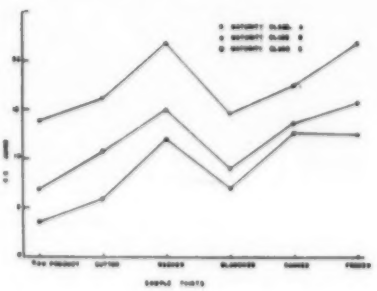


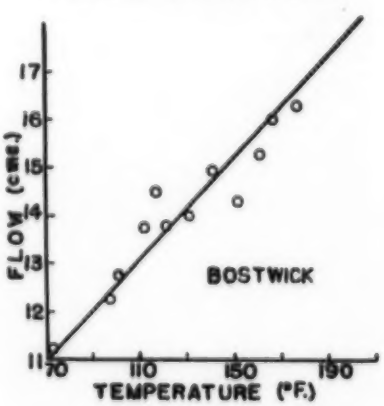
TABLE I

DRAINED WEIGHTS FOR CANNED TOMATOES

Container Size			Picnic	No. 303	No. 2	No. 2½	No. 10
Maximum headspace allowable (measured from top of double seam in 16th of an inch)			8.8	9.4	9.7	9.9	13.6
Classification	Score Points	Drained Tomatoes	Ounces	Ounces	Ounces	Ounces	Ounces
					Minimum		
Grade A	20	63%	7	10½	13	18¾	68¾
Whole	19	61⅓%	6¾	10¼	12¾	18¼	67
	18	59⅓%	6½	10	12¼	17⅝	65
Grade A	20	70%	7¾	11¾	14⅛	20⅛	76¼
	19	68%	7½	11½	14	20¼	74½
	18	66%	7¼	11	13½	19¾	72¾
Grade B	17	63%	6¾	10⅓	13	18¾	69
	16	60%	6½	10	12¼	17⅝	65½
	15	58%	6¼	9¾	12	17¼	63½
Grade C	14	55%	6	9¼	11¾	16½	60¼
	13	52%	5¾	8¾	10¾	15½	56¾
	12	50%	5½	8½	10¼	14¾	54¾
Grade D	11 or less		Less than in "C" classification				

FIGURE 3

EFFECT OF TEMPERATURE WITHIN THE RANGE OF 70°F. TO 190°F. ON BOSTWICK CONSISTOMETER VALUES

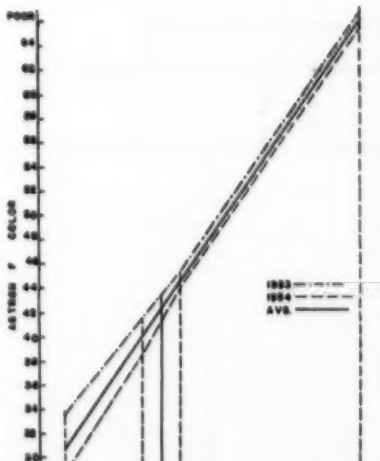


Let's take one other example to illustrate the importance of technical know-how in judging quality. This deals with the temperature of the product. Figure 3 illustrates the effect of temperature on readings obtained from tomato puree held at the same solids content over a range of temperature of 70° to 190° F. (3). The Quality Control Technologist must standardize on a specific temperature for his samples or erroneous values will be obtained when judging quality.

Probably the most difficult problem in the Quality Control Laboratory is the evaluation and standardization of product quality when evaluating the color of the product. The Macbeth Executive light is a fairly mobile standardized light source. The light source should be used for subjective color evaluation of raw and processed product. This unit has a color-corrected light source composed of two R 40 300-watt reflector flood lamps used with two 7½" Macbeth daylight filters. This light source-filter combination produces the closest duplication of North sky daylight (7500° Kelvin) that is commercially available. Larger units are also available for lighting large areas. One outstanding feature of this unit is that complete standardization could take place from laboratory to laboratory within the industry or within a plant for operations 24 hours a day. This should be one of the basic requirements for any laboratory which resorts to subjective color grading. To make this more objective, some type of benchmark must be used. The Macbeth-Munsell Disc Colorimeter unit has the same light source as previously described for the Executive unit. In addition, standardized discs or color plates are used. This unit is now used by the U. S. Department of Agriculture Processed Foods Inspection Service for the grading of tomato juice and other tomato products (4, 5, 6).

FIGURE 4

RELATIONSHIP BETWEEN AGTRON F COLOR AND USDA RAW PRODUCT GRADE—TOMATO JUICE



Several objective color instruments have been developed by various companies in recent years. Two of these appear to offer the tomato industry much in the way of standardizing the grading of raw and processing products. The Model E Agtron is an official instrument for evaluating color of raw tomatoes in the state of California by the California State Department of Agriculture. In Ohio it has also been found to be an excellent objective color instrument for evaluating quality of raw tomatoes (7). The instrument is used to evaluate the color of an individual, cut-in-half, raw tomato. Figure 4 shows data which may be used for evaluating raw tomatoes objectively according to the classification of the U. S. Department of Agriculture (10). Further, the data in Figure 4 illustrate a complete color scale for raw tomatoes, which enables the Quality Control Technologist to set up a "sliding scale" for high No. 1's to low No. 2's or culls.

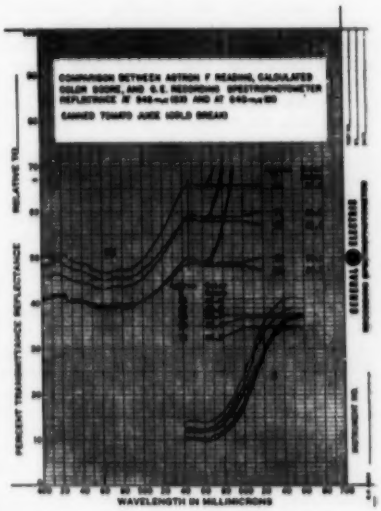
The Model F Agtron is an objective color instrument used for liquid and powdered products. In Figure 5 data are given for the evaluation of canned tomato juice quality objectively. These data are compared to data collected with the GE recording Spectrophometer. Mavis and Gould have shown a correlation coefficient of 0.92 with the Agtron and USDA color score for canned tomato juice (11).

A further application of this instrument (Agtron Model F) and the ultimate for the Quality Control Technologist is an in-line or an in-stream instrument. This instrument, the Model FX Agtron, is shown in Figure 6 and its place in the production line for evaluating the quality of tomato juice during manufacture is shown in Figure 7. Data collected by Mavis shows a correlation coefficient of 0.94 with this instrument and the Model F Agtron (10). This instrument offers the greatest possibility for the automation of liquid, semi-liquid and granular products for the evaluation of product color during manufacture. Other in-stream or in-line instruments are mechanical size graders, temperature and pressure regulators and controllers, salt and sirup density controllers and fill controllers (volume or weight).

Many other examples of laboratory and in-stream quality control instruments could and should be discussed.

FIGURE 5

COMPARISON BETWEEN AGTRON F READING, CALCULATED COLOR SCORE, AND G.E. RECORDING SPECTROPHOTOMETER REFLECTANCE AT 546 Mμ (5x) AND AT 640 Mμ (IX)

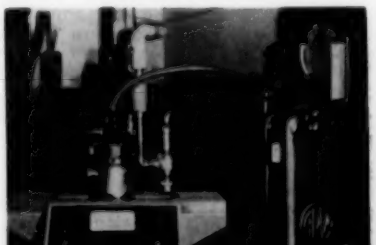


However, the above illustrations should serve to show the advances being made for the control and evaluation of the quality of raw and canned products.

Figure 8 is an organization chart for the Quality Control Department with these and other attributes of quality listed under the four major categories for the evaluation of product quality. Further, this chart serves to show the place of the Quality Control Department under management and its relation to the other departments. It should be emphasized that one of the main functions of the Quality Control Department is to

FIGURE 6

MODEL FX AGTRON—A CONTINUANCE COLOR EVALUATING INSTRUMENT



prepare reports. These reports are made on the data collected by the Quality Control Department. Special emphasis should be given to the statistical, graphic, and written interpretation of these data for management (9).

In summary, the quality of canned products is a result of intelligent and effective control of (1) raw products, (2) production and processing practices, and (3) packing according to given standards. Effective use of instruments to evaluate product quality objectively makes for greater uniformity and standardization of the degrees of quality for any given product packed under any given label. The Quality Control Department serves as the "nerve center" for the control of product quality. The modern food processor has a Quality Control Department staffed by a trained technologist who uses instruments for the objective evaluation and control of product quality at managments' desired degree of product acceptability for his particular label.

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Figure 7

Flow Sheet for Manufacture of Tomato Juice Utilizing the "Hot Break" Process with the Model FX Agtron shown "in stream" for Continuous Evaluation of Tomato Juice Color

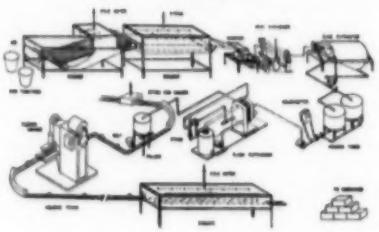
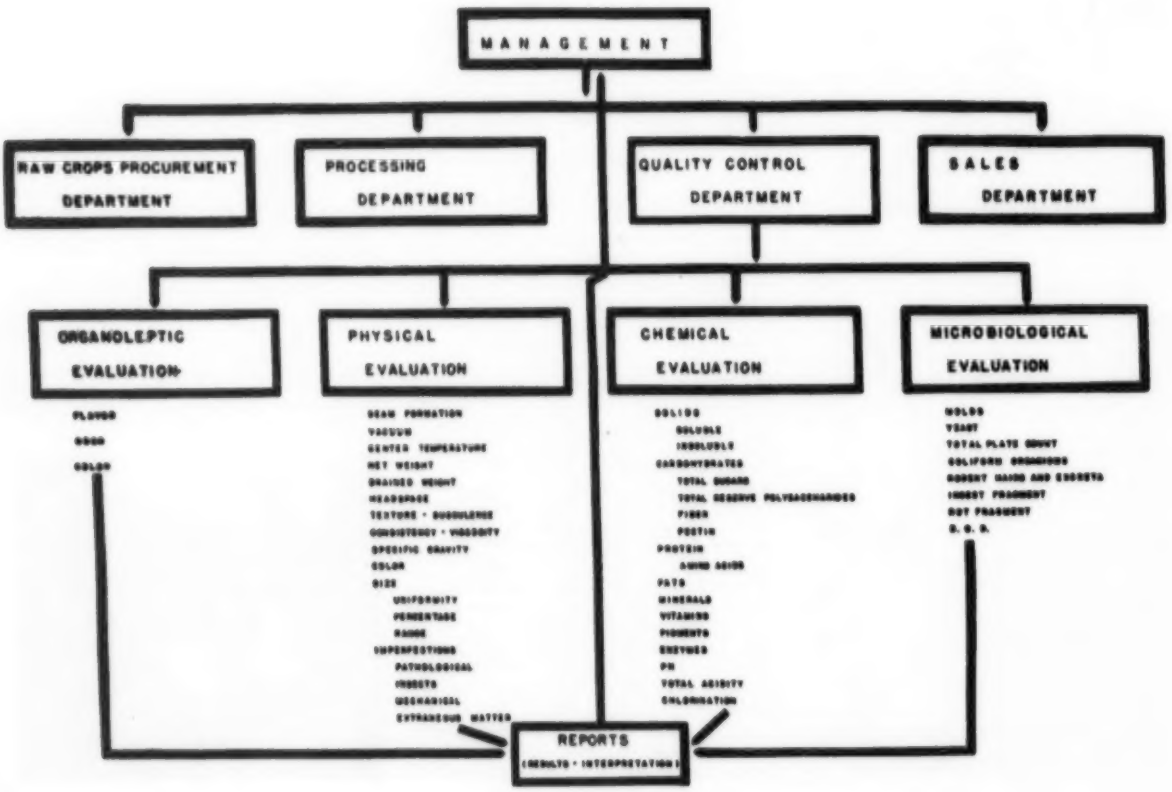


Figure 8

Organization Chart for the Quality Control Department with Some of the Attributes of Quality Classified According to Methods of Quality Evaluation



MATERIALS HANDLING AND RADIATION STERILIZATION

PRESIDING: C. A. Greenleaf, Associate Director, Washington Research Laboratory, N.C.A.

ADDRESS: "Raw Product Handling to the Cannery"—Lyle Seaton, Research and Development Dept., Continental Can Co., Chicago

ADDRESS: "Automatic Handling of Cans in the Modern Canning Plant"—W. A. Gueffroy, Closing Machine Dept., American Can Co., New York City, and O. G. Braun, Technical Service Div., American Can Co., Maywood, Ill.

FILM: "Packaging Foods in Glass"—Owens-Illinois Glass Co., Toledo, Ohio
DISCUSSION by C. P. Whittier, Manager of Customer Service, Packaging Research Division

ADDRESS: "Take a Look—at Your Warehouse"—P. Steele Labagh, California Packing Corp., San Francisco

ADDRESS: "Influence of Plant Layout on Materials Handling"—George Effertz, Production Engineer Manager, Green Giant Co., Le Sueur, Minn.

ADDRESS: "Status and Prospects of Radiation Preservation of Foods"—Col. William D. Jackson, Chief of Research and Development, Office of The Quartermaster General, Department of the Army, Washington, D. C.

Raw Product Handling to the Cannery

By Lyle Seaton,
Continental Can Co.

Food processors are well aware that the unit cost of production chargeable to field and factory labor has been increasing. In many instances, this increase has been greater on a percentage basis than the increased costs of raw products. The raise in minimum hourly rates mandatory in 1956 will result in still higher labor costs, and the supply of seasonal labor this year promises to be limited. Along with increased labor rates, in general, the output and quality of the work has decreased, and this depreciation in the quality of agricultural labor has often made it necessary to increase the amount of hand labor in the cannery on the sorting belts and inspection tables. Prices received for some of the major canned items have declined, but labor costs have increased and cannot be passed on either to the consumer or the farmer in today's competitive market. The practical solution of this labor-price dilemma would appear to be complete mechanization of all production and handling operations.

A noticeable revolution has been in progress the past decade in the mechanization of field production and harvesting of processing crops. Fieldmen's cars and field mechanics' trucks are in constant contact with each other and the factory by radio telephones. Sweet corn harvesters, practically unknown 12 years ago, now harvest more than 85 percent of the crop grown for processing. The mechanical green bean picker is coming into wide usage. Marked improvements are being made in pea harvesting equipment and methods. Picker belts are being developed for tomatoes, strawberries, pineapples, and other crops. Mechanical squirrels are used in pruning and picking tree fruits. These trends have been covered in many of the N.C.A. programs and at other canners' meetings. This equipment has materially reduced labor costs where used. To a limited extent, this general trend has been extended to handling methods for the raw products to the cannery, but many feel that progress in this phase of production has lagged behind what has been done in "in-plant" methods. Today, in a very general way, some of the progress in this field will be covered.

HARVESTING AND HANDLING CONTAINERS

The commonly employed methods for handling many fruits and vegetables require large investments by the processors in lug boxes, hampers, baskets, crates, cloth bags, and other small containers for use in field harvesting and to handle the millions of tons of products from the fields to the factories as well as on the cannery receiving platforms.

The standard container on the West Coast is a simple wooden box, commonly referred to as a "lug." It has been estimated (8) there are between 20,000,000 and 25,000,000 of these lugs in use on the West Coast, representing a total outlay of about $19,000,000. When all of the other types of lug boxes, crates, hampers, baskets, and other containers now in use in the United States are considered, an estimated outlay of between $75,000,000 and $100,000,000 by the industry seems reasonable.

The western lugs are a necessary adjunct to the industry, and despite low initial costs, they represent a perennial headache to the processor due to loss through misplacement and maintenance. The long packing season on a wide variety of products means hard wear and rough usage. Replacement runs between 7 and 8 percent per year on new boxes but does not reflect too closely the life of the box as there is much maintenance and repair work on the sides and bottoms to keep the lug in a usable condition. On an average, a packer may purchase three cars of repair shook for every 10 cars of new stock he buys. Collection and return to the original owner is a serious problem—somewhat like railroad box cars.

Somewhat smaller lugs are widely used for shelled peas, lima beans, cherries, and other small fruits and have all the same problems as the western lugs. In eastern, southern, and midwestern states, the 5/8-bushel and 1-bushel hampers are the standard field containers. They are light in weight, can be nested for storage and transported to the field. While they cost about half as much as lug boxes, they are short-lived, difficult to load, and handle. Breakage and spillage are major problems. In other words, they have all or more of the problems of the lug boxes. Cotton and jute bags are subject to mildew and rot and find many uses other than for the intended crops.

Obvious improvements in these small field containers now in use would include lighter weight with equal or more strength; a container less susceptible to rot, mildew, and deterioration; a container that weather would not affect; and, though the initial cost may be somewhat higher, would not require the maintenance and replacement of the present containers. To date, such a container has not been found. Perhaps, when the day comes when this improved type of container can be made a reality, new methods will have been devised which will eliminate the need for field containers entirely.

IMPROVEMENTS IN HANDLING SMALL CONTAINERS

Much costly, time-consuming, hand labor is required in the movement of lugs, crates, and hampers from the factory to the fields, in the fields during harvest, from the fields to high-

way trucks, and at the cannery receiving platforms. Several more efficient methods and special equipment have been developed to eliminate some of the hand labor involved.

Lift-trucks and palletizing systems have solved many warehousing problems with canned foods and are moving out to the cannery receiving platforms to handle the incoming raw products. Palletized loads of lugs of fresh products are unloaded with lift-trucks. The trucks are loaded with palletized empties for return to the fields. The lift-trucks handle the flow of products to the processing lines and in and out of storage and ripening rooms. Concrete examples of considerable savings in time and labor have been reported. An analysis (11) of handling operations at several Michigan plants reveals it took an average of 9.9 minutes for a crew of three men to unload 100 lugs of cherries by hand, while one man with a lift-truck did the job in 1.9 minutes. Savings in labor charges on 100 lugs amounted to 51.8 cents. In California (5) one company found lift-trucks enabled 15 men to do the work on the receiving platform that formerly required a crew of 60; while another company reported that trailer loads of fruit could be unloaded in 12 minutes with lift-trucks where by hand 8⅓ man-hours were required; and at still another cannery, trucks were unloaded in approximately 15 minutes by lift-trucks, less than one minute per pallet load. Rapid unloading of trucks and quick loading with empties eliminates their tie-up waiting to be unloaded, fewer trucks are required, and much confusion is eliminated.

Combinations of lift-trucks and automatic or semi-automatic box-dumpers have speeded and simplified the flow of raw products from the receiving areas into the cannery. Several types of box-dumpers have been devised. Some are capable of handling entire pallet loads of lugs, dumping one entire layer at a time. Others feed the individual boxes to single or double belt conveyors with tilting type box-dumpers. The empty lugs are inverted, conveyed through washers, and palletized for their return to the field.

To be effective at the cannery, palletizing must be carried back to the field and orchards. In some areas of concentrated fruit production, small privately-operated receiving stations have been replaced by large paved receiving and inspection stations operated jointly by a number of processors. Here lift-trucks unload the growers' field trucks, samples are inspected, and the fruit is reloaded on highway trucks for movement to the cannery. Some growers have paved areas in orchards and fields where lift-trucks may be used. Many lift-trucks are employed in privately-owned growers' storages.

On the transport trucks, the side-boards and tailgates have been eliminated. The lugs are secured firmly by special steel corner clamps tightened and held in place by steel cables operated by a small winch on the truck or trailer-body.

Around pea viners and under rough field conditions, palletized loads of lug boxes are moved by tractors (7) equipped with a simple lift mechanism powered by a hydraulic drive off a front end pump attached to the tractor's crank shaft. The attachment is versatile with a hold-down clamp on top, a side shift for spotting the pallets on the truck, and a tilt cylinder for leveling the pallet load with the truck bed. A heavy weight is attached to the front of the tractor to counter-balance the load. This attachment eliminates hand loading of lugs in the field and is used in moving pallets of empty lugs.

Many types of special orchard and field trailers (4) have been developed to meet special conditions as well as special palletizing techniques to meet conditions where the side clamp types of lift-trucks are used. In some of the eastern areas, a pyramid method of stacking hampers on the trucks makes for easier unloading.

Tote Boxes and Other Large Containers

In several areas the smaller types of containers have been replaced with large "tote" boxes for the handling of such crops as green beans, field peas, apples, root crops, and green leafy vegetables. In the Pacific Northwest, until about five years ago, the canners of Blue Lake green beans used cloth bags (sugar liners) for the movement of the beans from the growers' yards to the cannery. Today very few bags are found in this district as most packers have changed over to large wooden tote boxes holding 1,000 to 1,200 pounds of beans. A pallet is an integral part of the bottom of the box. In the bean yards, the beans are hand picked in buckets, hampers, or cloth bags. The pickers bring these to the end of the trellised rows where they are weighed, the picker's card is punched, and the beans are emptied into the tote box where an opportunity for visual inspection is afforded of each picker's work, and extraneous material may be removed. When filled the tote boxes are loaded with tractors or trucks equipped with lift attachments into flat bed trucks for movement to the cannery. After weighing in at the factory, the tote boxes are unloaded with a load-grab equipped fork truck and taken either to a storage area or dumped directly to a conveyor hopper which starts the beans into the processing lines. The fork truck is equipped with a revolving load-grab attachment. The pallet arms are spread by hydraulic power to hold the boxes firmly. It is a free lift model with dual drive wheels, with a capacity of 2,000 pounds at 15 and 24-inch load centers. The range operating height to the bean conveyor hopper is about 12 feet. One operator and a lift-truck expense of about $1.50 per hour can handle the whole receiving operation with a volume of 20 tons of beans an hour (9). He can take the tote box from the truck, raise it to the bin, dump the beans into the conveyor hopper, and place the box with the empties, all in one continuous operation. At some canneries the tote boxes are unloaded by placing the boxes in a rigid metal container which is tilted to feed the beans to a conveyor belt for movement into the factory.

The Pacific Northwest tote box is used for root crops, sweet corn, and other products and has been adapted in other areas. A smaller palletized tote box holding about 20 bushels is used by some packers in Michigan and New York State (1). Large reinforced wire baskets are used by some sweet corn canners.

For the past two seasons, a large packing operation in eastern Maryland (3) has pioneered the use of 25-bushel wire-bound pallet boxes to replace bushel hampers with green beans and has extended their usage to Irish and sweet potatoes, cauliflower, broccoli, sweet corn, and spinach. Controlled tests showed that in harvesting 1,900 acres of green beans, the pallet box system freed one truck and 10 laborers over the full period of the harvesting season. The wire-bound boxes used have a basic 30-inch outer length x 40-inch x 46-inch form constructed from pine skids with gum stakes of open spaced construction. Sides are bound with six parallel turns of 13 gauge rock fastener wire. Skids are designed to permit nesting of the boxes. They cost about $9.00 each as compared to 40 cents each for bushel hampers, which last for only about three or four trips. The initial cost of the box would cancel out if eight trips were made, but some of the boxes have made more than 100 trips. The smaller lighter weight boxes (90 pounds) can be hoisted on the truck in the field by two men and are arranged in the truck bed two abreast, two high, and as many in depth as the body will accommodate. At the factory, the average unloading time was about 14 minutes per truck with no waiting time.

In the modernization of pea and lima bean vining, the tendency seems to be to do away with the single units and to replace them with large batteries of viners often in the premises of the cannery. The shelled peas are handled in large metal bins mounted on rollers and equipped with rapid emptying spouts at the bottom. Some viners adjacent to the factories have been equipped with belt conveyors to carry the peas to the cleaners and on into the processing lines.

Substantial reductions in the cost of moving citrus fruits from the trees to the processing plants have been reported from recent studies in Florida (14) (15). The wooden field box has been replaced by two-wheeled trailers in the groves and special elevators at the roadside to transfer the fruit to semi-trailers. Large wire baskets handled by tractors equipped with hydraulic lifts are used in collecting and getting the fruit out of other groves. In some of the cranberry bogs of Wisconsin, the small boxes have been done away with in the harvesting operations. Specially built water-tight metal boats are floated beside the mechanical pickers to catch the berries and to transport them to the cleaning station.

Bulk Handling

Certain products may be handled without the use of small containers or the large tote boxes. In the lower Rio Grande Valley of Texas, canners have recently found the light trailers used in harvesting cotton are well adapted to handling green beans and field peas from the fields to the canneries. They may be used under any field condition, and on the road several can be pulled by one truck. At the receiving area of the cannery they may be unhitched, segregated as to quality, and unloaded as needed. The slatted bodies provide good air circulation, and spoilage due to heating or mold development experienced with cloth bags is minimized.

The long-established system of unloading wagons and trucks of sweet corn to storage bins and wagons is being replaced by a system of dumping the sweet corn on concrete aprons and pushing it into submerged conveyors with a "corn-dozer" as it is needed in the factory (2). This bulldozer, equipped with a special blade, saves much time and shortens the time required to get the corn to the huskers and cutters. Similar methods are well adapted for handling beets, carrots, potatoes, and other root crops.

Mechanization of harvesting operations and semi-bulk or bulk handling of spinach (13) and other greens has drastically reduced labor costs and resulted in improved quality of the raw product delivered to the factory. By the use of mechanical harvesters and special trailers or trucks, crews of five or six men now do the work formerly requiring 100 to 150 field laborers (10). The rapid movement from the field to preparation department, and the reduction in the number of handlings, result in greater conservation of quality than was ever possible to achieve by the hand cutting and crate method formerly used.

Hydro-Cooling and Water Transportation

For the past three seasons, interesting experiments have been underway in Michigan (11) (12) to determine whether or not putting red sour cherries into water at the orchard immediately after being picked and transporting them in tank trucks to the factory is a more effective method of maintaining quality than moving them in lugs. Normally, in one round-trip from the cannery to the orchard, a lug is lifted, moved, and stacked from 10 to 12 times. In 1954, an entire crop of 152 tons of cherries of one orchard was handled without the use of a single lug. Had the conventional method been used, between 1,000 and 1,500 lugs would have been needed and at current price would have cost $500 to $750. The tanks for the truck movement cost only $150. The man formerly employed to distribute lugs in the orchard and the one who accompanied the driver to handle the lugs were released for other work. Practically all of the cherries were in cold water less than one hour after picking, and much of the fruit was in cold water within a few minutes. The weight of the steel tank and water used for transporting was about the same as that represented by the weight of the empty lugs formerly used. It was found that "transporting cherries in water helps maintain the tree quality, provides a means of improving grade by orchard sorting, reduces costs of handling, eliminates lugs and lug storage, maintenance, distribution and accounting problems, simplifies management, and is commercially feasible."

The method mentioned above could perhaps be used for other raw products. Where pea and lima bean (6) production areas are a distance from the plant, the products are vined in the field, cleaned, washed, cooled, and transported in tank trucks of water. These trucks are equipped with sloping bottoms and large gate valves for feeding directly into water-conveying flumes at the factory. In some cases, these products may be handled in large steel drums with crushed ice added.

In conclusion, it seems evident that improvements in handling of raw products from the field to the cannery afford a fertile field to the processor interested in reducing labor costs. Apparently some progress has been made, as, for the first time in 70 years, the harnesses for work horses were not listed in Montgomery Ward's 1955 Farm Catalog.

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Automatic Handling of Cans in the Modern Canning Plant

By W. A. Gueffroy and O. G. Braun, American Can Company

As an important means of reducing operating costs, the speed of canning lines has been increased markedly in the past ten years. In order to supply the volume of cans needed, handle the goods produced by these lines, and further reduce costs, more and more labor saving devices and automatic can handling equipment are being introduced. Within the past two or three years in particular, a great amount of effort has been expended in connection with more efficient methods of packaging and handling of empty cans. Emphasis is being placed on automatic handling of such packages as well as on the automatic unloading and unscrambling of the cans at the canneries. Filled can-handling equipment is also continuing to receive attention and some of the new developments in these fields will be outlined below.

Empty Can Handling at Packers' Plants

Before proceeding with detailed discussions of handling of cans as received by different methods of shipment, a general explanation of usual methods of transporting empty round cans within canneries is in order. Except for very low-speed lines and

lines that operate only for short periods, the cans should be taken from their shipping package at some point distant from the filler or packing table. The reason for keeping the can feeding point away from these points of usage is to prevent cluttering up of already crowded areas. Naturally, where cans are taken out of bags, cartons, etc., considerable amounts of dunnage are accumulated and ample space is required for this material. Cans are usually conveyed along conveyors or gravity tracks. Elevators and lowerators are also used when sudden changes in elevation are required. The generic term for these means of conveying is "can runways."

Feeding from floors above the canning or filling room including mezzanine floors permits the use of gravity runway tracks. These are the simplest types of runways and the most economical to acquire. Where gravity track alone cannot be used, elevators, cable conveyors and other types of conveyors are utilized. In such cases electrical controls are desirable in order to prevent objectionable crowding of cans, which, in extreme cases, could cause distortion of cans and other difficulties such as jamming of the runways.

In the empty can systems, the feeding of cans should be at a greater rate of speed than the filler or packing device requires. The excess speed will cause cans to crowd back along the runways, either filling the lines in the case of gravity or stopping the motors driving the conveyors, elevators, etc. in the case of powered runways. When the runways fill up, the feeders merely stop working until there is space for additional cans. A certain amount of crowding of empty cans in the runways is desirable to prevent production gaps at the fillers; for, with a reasonable supply of cans available at the filler or packing table at all times, minor breaks in feeding will not cause a shortage of cans where they are needed. Feeding gaps are not unusual since occasionally cans are dropped from the fork or cans may stick along the runway.

During the 1930's and 1940's packing and shipping of empty cans was pretty much standardized. The methods then in use in the order of volume were (a) bulk rail cars; (b) bagged cans (Canco carriers) and (c) reshipper cartons. These methods are still most widely used.

BULK RAIL CARS

Shipping cans in bulk rail cars still ranks No. 1 for transporting sanitary cans from the can factory to the cannery where distances of over 40-50 miles are involved. Unloading is necessarily manual but the use of handling forks permits picking up quite a number of cans at a time. With efficient runways this is a rather economical method both from a "delivered cost of cans" as well as from a "cost of unloading" point of view. However, widely varying unloading practices are in use and the output per man varies as much as 3 to 1. Among the reasons for this condition are factors such as:

(i) Type of fork used—single row, double row, or multi-row

(ii) Type of can receiving boot, track or device used in the rail car, and

(iii) Experience and efficiency of the workers.

Taking small cans for example, such as 202 x 314, about 25 cans are taken at a time with a single row fork spanning half the distance across the rail car. With two row forks, 50, and with multi-row forks, up to 100 cans are taken at a time. Naturally, an experienced operator with the multi-row forks can handle many more cans per unit of time than the same man could handle with a single or double row fork. Feeding rates up to 500 per minute by one man are not beyond reach providing the equipment set-up is correct. For larger cans such as 300 x 407 and 303 x 406, speeds up to 300 per minute are quite possible. In handling the 401 x 411 and 404 x 700 sizes, the top speed is naturally lower but about 150-200 cpm per man are entirely feasible.

Where uninterrupted production is necessary, arrangements to relieve the feeder at times are necessary. For starting and finishing a car, assistance is usually needed for a short while, and, of course, there must be relief periods. Where several cars are unloaded at a single location a relief man can be kept busy. Where only one is unloaded a man having other duties should be available as needed for the relief work.

BAGGED CANS

Next in volume of cans handled are shipments in Kraft paper bags. In this method of shipping, we deal with Canco carriers and other similar packages in which the cans are pattern stacked vertically with paper or chipboard separators between layers of cans.

Many canners unload directly from the bags by use of suitable can forks. In such cases the carriers are placed horizontally in racks convenient to the receiving chute or runway. A recently developed fork handles a whole layer of cans at a time and utilizes a slotted receiving boot for receiving the cans and feeding them to the runway.

Some attempts have been made to devise a means for allowing a layer of cans at a time to roll into the runway by gravity. An operator is required to advance the bag and keep the cans moving and also to remove the separators. Therefore, no particular advantage is obtainable with this type of device.

There are several semi-automatic unloaders for these types of packages. Each involves the use of one or two operators, depending upon speed of feeding, and uses a sweeping device for sliding a layer of cans at a time from the bag to the table of the feeding unit. The device delivers the cans in single file to the runway. The arrangement for holding the bag also has means for lifting it a distance equal to the height of the can at a time. The separators and the empty bags are manually removed and stacked for disposal or return by the operator.

RESHIPPER CARTONS

Regular shipping cartons for full cans are also commonly used for packing empties at the can factory. This package is provided essentially without cost since its primary purpose is to be a shipping container for the filled cans. Either the top or bottom flaps only are glued to facilitate removing the cans at the packer's plant. Where applicable, this is probably the best package for empty cans. It affords the maximum protection to the cans regardless of shipping media. Its use is somewhat limited, however, since many packers are unable to use it for one reason or another. It can be used economically by packers who

(i) Use large volumes of single size cans with one label and a limited number of different cartons and

(ii) know in advance what kind of cartons they will use.

At the cannery, extremely efficient arrangements are available for unloading cartons and removing the cans from them. Cartons can be placed on conveyors in the rail cars or trucks or they can be palletized for handling by fork lift trucks. In some cases deliveries are made via truck with cans on pallets and dollies or roller conveyors are provided to facilitate moving the pallet loads to the tail gate of the trucks.

Removing the empties from cartons can be accomplished by various means.

The data in Table 1 are based on 211 x 414 size cans packed 24 or 48 per carton.

With arrangement (i) it is difficult for one operator to handle the job unless cartons arrive at the feed disc via conveyor. Arrangement (ii) is very similar to (i) manpower-wise. Hoppers must be properly designed for lithographed cans as they may be overloaded by the operator and cause severe scratching of lithography. For high speed and efficient operation, the unloaders with unscramblers are the best means available for automatically removing the empties from the cartons and delivering the cartons to conveyors for automatic delivery to the casing machine. The operator on the carton unloader and unscrambler merely observes and releases cans or cartons that, for one reason or another, hestitate or stick.

TABLE 1

Line Speeds	150–300	300–400	400–600	600–1000
(i)	small feed disc one man	feed disc with belt 1 to 2 men	large feed disc with belt—2 men	—
(ii)	Hopper type unscrambler—one man	Hopper type unscrambler—one man		
(iii)		Automatic carton unloader with unscrambler—*one man	Automatic carton unloader with unscrambler—*one man	Automatic carton unloader with unscrambler—*one man
(iv)		Magnetic unloader—one man	Magnetic unloader—one man	

* Where more than one unit is employed, one man can serve two units.

There are several makes of automatic carton unloaders and unscramblers available. Two types of magnetic unloaders for reshippers have been developed. Neither has been in successful operation for very long. The major difficulty which this type of unloader must overcome is the successful removal of a full layer of flanged cans at a time from the cartons. Cartons should fit the filled cans rather snugly and since the flange diameters of the empty cans are about 3/32" larger than the finished seams, they fit into the cartons rather tightly. Spilling the cans from the reshippers in jumbled fashion is much easier than removing them a layer at a time as is done with the magnetic unloaders.

Other methods for unloading reshippers are being introduced. One interesting development is a device that attempts to duplicate a man's movements in upending cartons to dispense the cans onto a feed disc. A prototype device is being tested.

JUMBLE PACKED CARTONS

In addition to the three well-known methods of shipping empty cans discussed above, a number of other procedures are being used. One of the simplest means of mass handling of cans is by use of jumble packed cartons. These are strong collapsible fiber board cartons, cubical in shape, into which cans are poured at random. Flaps are closed and tied with cord at the can factory.

Jumble packed cartons can be placed on pallets at the cannery or can even be kept on pallets in the delivery truck or trailer, or they can be placed on roller or belt conveyors directly from the delivery vehicle. The choice is usually dependent upon physical features of the cannery, but, in some cases, personal preference decides the method used.

The use of an automatic unscrambler is mandatory for efficient feeding of cans from jumble packed cartons. The usual procedure is to have the operator cut the string on the carton, pick up a carton and pour the contents into the hopper of a suitable unscrambler machine. From the unscrambler cans move via conventional runways to the fillers or packing tables. With an efficient setup a single operator can readily handle up to 1,000 cpm of the small and medium size cans up to and including 303 x 406 containers.

Empty cartons are collapsed and collected in bundles for return and reuse by the can factory. Cartons obviously must be kept dry and clean for successful reuse.

JUMBLE PACKED TRAILERS

Some relatively recent experiments and commercial application of truck delivery with cans packed random or in jumbled fashion have proven successful for medium and small size containers. Highway trailers equipped with loading hatches and conveying means for unloading of cans are used. Naturally, proper equipment and arrangement are necessary at the cannery to utilize this method economically and efficiently.

The trucks or trailers are equipped with powered conveying means for slowly moving the entire load of cans which is surrounded by a four-sided liner or in 4' x 7½' x 7½' bins beyond the tail gate of the truck. Cans pour from the liner or bins into a cross conveyor at a feed rate which is controlled by simple electrical devices. The boxes or liner are supported by a roller conveyor while being unloaded. After unloading has been completed, the liner or boxes are returned to the trailer or truck. The cross conveyor which receives the cans from the trailer conveys the cans to the hopper of an automatic unscrambler similar to the unit used for jumble packed cartons.

Where conditions are right, this is a very efficient system and a single operator can feed 1000 or even twice that many cans per minute of sizes in the range of 6 to 12 ounce capacity.

The main requirements for the successful application of this system are:

(i) *Minimum Distance Can Factory to Cannery*—preferably not over 50 miles (depending on traffic conditions)

(ii) *Large Volume in Each Can Size to be Handled*

(iii) *Correct Setup at the Cannery for Unloading*—even though the setup requires considerable expense.

(iv) *High Speed Electrically Controlled Runways* (including dividers which are necessary if more than one filler is to be supplied) to convey the cans from the unscrambler to the fillers.

Experience has shown that even lithographed cans up to and including 211 x 414 size show less damage when handled by this method than when shipped in bulk rail cars. Some scratching of litographed cans is evident but this is minor compared to the damage received by full cans in normal channels of distribution.

BULK-O-MATIC SYSTEM

A modification of the jumble packed trailer method called "Bulk-O-Matic" is being developed by the American Can Co., and is now approaching the commercial stage. Large bins or boxes about 4' x 7½' x 7½' are utilized. One side of the bin is hinged or removable for loading. One end is equipped with a door for unloading. Up to eight of these bins can be placed in a trailer which is fitted with an idle roller conveyor. These large boxes or bins are arranged for handling by fork lift truck at the can factory as well as at the customer's plant. The roller conveyor in the trailer serves to roll bins to the tail gate and preferably beyond the tail gate onto the cannery conveyor to facilitate fast unloading. From the receiving conveyor these boxes can be handled by fork lift truck to suitable unloading stations. The unloading setup is distinctly similar to the arrangement used for jumble packed trailers, but is less elaborate and therefore less costly. Unscramblers are used and the electrical controls are simple.

Cans are pattern loaded in the Bulk-O-Matic boxes mainly for the reason that approximately 20 percent more cans are contained when loaded in this manner than when jumbled. This, of course, saves money on transportation. The advantage of this method over jumble packed trailers for general use becomes apparent when one considers the storage possibilities through handling the bins by fork lift trucks. Manpower-wise there is not much to choose between this method and the jumble packed trailer method.

PALLETIZED CANS

Wooden pallets with cans pattern stacked vertically with chipboard separators between the layers are also used to ship cans from the factory to the cannery plant. Depending upon the distance of hauling and can size, these packages are unwrapped, wrapped with fiberboard and in some cases, metal strapped. Pallet sizes are reported to approximate 4 feet square containing about 2,500 303 x 406 cans or their equivalent. At least three or four commercial or semi-commercial installations for handling these packages are now in use. Two types of machines each for loading and unloading have been developed.

One of these employs the magnetic principle for lifting and transferring cans a layer at a time from the conveyor to the pallets for loading and vice versa for unloading. The other unit sweeps the cans onto the pallet in loading and sweeps the cans off the pallet a layer at a time in unloading. All of these units are capable of high speeds. For example, on medium size cans such as 303 diameter, speeds up to 1,200 and even 1,500 cans per minute are possible.

The success of this method will depend to a large degree upon the economical reuse of the packaging materials. The pallet with chipboard separators, fiberboard wrap-arounds and straps is rather costly and unless these items are reused for a substantial number of trips, the unit cost will be higher than for the other methods described.

Storage of Cans

An important element in the economic utilization of any of these can handling methods is the ease in which they can be adopted for storage cans. Even with properly arranged bins and elaborate conveying systems, the extra labor cost for stacking and removing bulk cans from bins is substantial. The area devoted to can storage is in some cases of little value for other purposes and therefore, even though the cannery be equipped with an efficient bulk railroad car system, consideration should be given to receiving cans for storage in one of the types of package described above. In addition, some protection against sweating of the cans due to sudden changes in the temperature of the warehouse is afforded by the packaging materials. Under severe conditions, of course, even packaged cans might rust in storage. *All precautions should be taken with cans in bags or cartons to avoid moist atmospheres conducive to the formation of rust.* Carriers and cartons should not be stacked directly on concrete floors. It is advisable to maintain as uniform conditions of temperature and humidity in the warehouse as possible.

Filled Can Handling

As already indicated for empty cans, considerable attention is also being given to labor saving methods of handling filled cans in the cannery. Speed regulation in transporting full cans should be the reverse of empty cans, and therefore the full can runways should be geared to remove cans from the closing machines at an increased rate of speed. Such an arrangement will prevent crowding of cans back to the closing machine, which, of course, would result in jams and production stops. Full cans, because of their weight, are subject to damage through sudden impact or "denting." Minimum use of gravity runs except for short distances and for very small cans should be made and the pitch or the drop per foot in these must be correct. Vertical drops should be entirely avoided for full cans.

Formerly, practically all of the vertical retort crates in particular were filled by strapping. In this method cans are discharged from the closing machine onto a table adjacent to which the retort cars or crates are placed. A large strap is used, held at each end by the operator. A quantity of cans is surrounded with the belt and slid off the table into place in the retort car. With this method it is possible to pattern load the cans at fairly high rates of speed (up to about 300 cpm on small size cans). While the cans are jarred quite a bit in this method, no serious denting or damage is done to the cans.

Small size cans are often allowed to fall at random into retort baskets from the discharge of the closing machine. Paddles, screens, or chutes are usually used to cushion the shock of the initial drop. These are placed in position by the operator and shifted as required. As indicated, this method of loading retort baskets is only applicable to small, light weight cans since excessive denting of the containers would result on the heavier cans.

A rather efficient method for tray loading is commonly used in Alaska salmon canneries. Trays known as "coolers" are loaded semi-automatically by placing them at a declining angle at the end of the discharge conveyor from the closing machine. The cans are slid into position on the trays by gravity and the operators touch only a few cans on each tray. A switch arrangement permits switching the cans from one tray station to the other to give the operators time to stack the trays on retort cars.

Several mechanical aids have been devised to allow more rapid handling of the cans by the operators. One such device consists of parallel bars with lugs which engage the countersink of the cans or the seams of the cans respectively where the cans are handled in horizontal position and vertical position. The handles are hinged to open and close the bars so that the operator can pick up a row of cans and release them as desired. This device is mainly used where cans are pattern stacked in retort cars, either vertically or horizontally. One side of the retort car or crate may be hinged or removable to facilitate loading.

A counter weighted suction head fitted with vacuum cups so arranged to pick up a definite arrangement of cans off the discharge table of the closing machine has also been used to speed the pattern loading of retort crates. The counter weight operating through an overhead pulley partially offsets the weight of the filled cans and lessens operator fatigue. A conveniently placed lever actuates an external source of vacuum to pick up and release the cans as desired.

In an attempt to eliminate more of the manual labor required to load and unload retort crates, a system has been devised which employs a hydraulic lift at the discharge table of the closing machine. Retort baskets fitted with false bottoms are positioned over this lift and the piston is raised to bring the bottom of the crate even with the discharge conveyor. After one layer has been filled into the crate, a perforated metal plate is placed over the cans and the lift lowered until the new plate is even with the discharge conveyor. After the second layer is filled, another plate is placed on top to accommodate the next layer and so on until the crate is filled. In unloading, this procedure is reversed and each layer is swept off successively onto a disc which feeds the labeler and caser.

When originally introduced, some difficulties were encountered due to understerilization of goods loaded into retorts by this system. It was soon recognized that the divider plates placed between each layer of cans tended to seal off air pockets in the sterilization chamber, causing poor heat distribution in the retort. However, experience to date has shown that with some changes in the venting schedule, the air can be satisfactorily removed from any retort filled with crates fitted with properly constructed plates provided the retort is equipped for venting as recommended in Bulletin 26-L. This matter was discussed in detail by Alstrand and Blair at one of the technical sessions at the 1955 Convention. (1)

A completely automatic, hydraulically actuated retort crate loader and unloader was introduced some years ago. In using this equipment, the closing machine discharge conveyor delivers the cans to a rotating disc which is of the correct size to collect a layer of cans for a vertical retort basket. Electrical devices stop the flow of cans to the disc momentarily when the disc is filled, and set into motion an overhead electro magnet. This picks the entire layer of cans from the disc and deposits them into the retort basket. The operation is repeated for each layer, and an operator removes the filled baskets and positions the empty ones as required. Similar equipment is utilized for unloading vertical retort crates and, in this device, the feed disc single files the cans into a runway leading to dryer, labeling machine and caser.

Filled can unscramblers are in quite general use. Several commercial units are available for lifting and tipping both horizontal and vertical retort crates or cars, discharging the cans onto a system of belts. The cans pass on through several sections which align them so that they travel in a horizontal position at sufficient speed to contact a vertical plate at right

angles as they span a cross runway. This cross conveyor leads them to an elevator or other separating means to single file the cans.

Various schemes have been used to load the retorts or processing kettles automatically. In some canneries, vertical retorts are used suitably connected with in-feed conveyors at the top and discharge conveyors at the bottom. When the retorts are charged a substantial amount of water is kept in them to cushion the shock of the cans dropping off the conveyor into the retort. After processing the retort is opened at the bottom and the cans allowed to slide onto the conveyor over a declining chute. This method is definitely suitable for small sardine cans and is probably suitable for small cylindrical cans.

Some retorts are fitted with a vertical shaft containing a number of discs which rotate during loading. The operator controls the height position of the reel to align each disc with the feed-in conveyor. For unloading the retort, the procedure is reversed. The cans are thrown off each disc by centrifugal force into the discharge runway.

Completely automatic handling is achieved in the reel type continuous retorts and coolers. This type of unit consists of a long cylindrical vessel equipped with a rotating reel and suitable intake and discharge valves through which the cans enter and discharge. The reel is fitted with lateral channels at the periphery and with a spiral track such that each can moves along the channels as the reel rotates. While this type of equipment is costly it is, of course, very economical in operation since it is fully automatic. Can runways are used to convey the cans from the closing machine to the retort and to receive the cans emerging from the retort (or cooler where used).

For many years filled cartons from the casing machine were simply placed on suitable trucks, moved to the storage area and manually stacked as high as the floor load or ceiling height would permit. In some cases, portable elevating conveyors were utilized. In the last several decades various methods of palletizing have been developed which allow large blocks of cartons to be moved by power equipment. The advantages of such handling are obvious. As a further refinement, within the last two or three years several makes of automatic palletizing devices have been developed. While they vary in detail, all of them place the filled cartons on the pallets automatically and require only one operator to attend the unit.

Empty pallets are stacked in a magazine from which they are moved into loading position as required and the filled pallets emerge on a roller conveyor for pickup by a fork lift truck. Some of these machines will turn the cartons as they are received from the feed-in conveyor, depending upon the carton size; two may be placed crosswise and the next three length-wise on the pallet. The next layer would be reversed; the first three length-wise and the next two cross-wise, and so on, thus making an interlocked package. All of these units have substantial capacity and can handle up to approximately 35 cartons per minute. These units together with the necessary collecting runways and controls are expensive but they are said to be economically justified at production rates of 15 cartons per minute.

The increased use of automatic can handling equipment is not without its hazards. The importance of the part played by can abuse in causing container leakage and spoilage is becoming more and more significant as more use is made of mechanical filled-can handling devices. This subject was discussed in detail in a paper presented at this Convention four years ago. (2) The force and consequent damage of an impact varies as the square of the speed so that trebling the speed multiplies the impact force by nine. Runways over which cans pass without control permitting them to reach high speeds, elevators out of adjustment, poorly designed equipment or machines operating in excess of their rated capacity or in poor mechanical condition, all may produce seam deformations which may momentarily break the seal at that point. It has previously been shown that the use of contaminated cooling water aggravates the difficulties experienced by can abuse. However, later findings have shown that recontamination of the cans may just as readily occur from dirty runways and equipment over which the cans pass after cooling. The sanitary condition of this equipment is directly related to the amount of moisture present in which spoilage organisms can multiply. The value of effective can dryers used directly after cooling is thus indicated. In addition, the filled-can handling equipment should be cleaned regularly to remove contaminating deposits of extraneous material, and should be inspected periodically for maladjustment which may cause can abuse. Good sanitary practices not only lead to decreased losses and trouble-free operation but also help produce a clean appearing container so important to the modern housewife.

Conclusion

Many economies can be made in handling empty and filled cans by taking advantage of some of the newer packaging methods and handling machines. However, handling methods which may prove advantageous in one location may not lend themselves to efficient operation under different circumstances since each canning plant with its individual layout and packing schedule presents its own problems. Consequently, each plant must be studied by an experienced engineer familiar with all the accepted practices before the best arrangement for any particular location can be suggested.

The potential hazards of employing some of the newer techniques must be recognized and corrective measures taken to minimize the inherent dangers. While some denting and scratching of empty and filled cans is inevitable in high speed handling, this damage must be kept to a minimum to avoid spoilage losses exceeding the savings realized in handling costs.

References

(1) D. V. Alstrand and B. W. Blair, "Venting Requirements for Vertical and Horizontal Retorts Using Automatic Loading & Unloading Systems", Proceedings of the 49th Annual Convention, National Canners Association, Information Letter No. 1526, p. 67, February 28, 1955.

(2) O. G. Braun and W. L. Pletcher, "Influence of Post-Cooling Operations on Spoilage by Recontamination", Proceedings of the 45th Annual Convention, National Canners Association, Information Letter No. 1371, p. 39, January 30, 1952.

Packaging Foods in Glass

Film by Owens-Illinois Glass Co.; Discussion by C. P. Whittier, Packaging Research Division

As a member of the Packaging Research Division of Owens-Illinois, I have spent the greater part of the past 20 years working directly with our customers on their glass container handling problems. These have ranged from the operation of specific packing equipment to the complete planning of packaging and warehousing facilities.

During our work we naturally encounter many people who are packaging in glass for the first time. It has been my experience that had I been a professional gambler and made book on the success and efficiency of glass container packaging operations, the odds I could have obtained from customers entering the glass packaging field would have paid me handsomely. In other words, the knowledge of the characteristics of glass as a material combined with known principles of materials handling, the correct equipment properly installed, adequately maintained and operated, will result in the efficiencies and speeds desired. Each packaging material has its particular characteristics that must be studied and understood. When that is properly done, the solution of the packaging problem is considerably advanced.

Another important aspect is the proper teamwork between the packer, package supplier, and machinery manufacturer. A mutual respect for each other's judgment and experience in these matters will go far toward expediting the solution of packaging problems.

It has been said that the only thing that stands in the way of obtaining desired production speeds and efficiencies on glass packaging lines is the willingness of the packer to accept the economics of the situation. Where that has been squarely faced, packaging of food products in glass containers is being performed at speeds, costs, and efficiencies in keeping with the stringent demands of modern day production in your industry.

Perhaps you feel it is easy enough for me to make statements such as this, but the proof of the pudding is in the digestion. In other words, what evidence is there that glass packaging can be performed on high speed, low cost, efficient packing lines? For obvious reasons, Owens-Illinois has for many years had a very real interest in this problem. That interest included not only the desire to assist customers in solving their problems, but to record the progress that has been made in this regard. To that end, from time to time our company has put together a film story on glass container handling. These go back over a number of years. It is my purpose today to show you our latest edition, prepared something over a year ago. Our report prior to this was just over 10 years ago. We have not attempted to show in complete detail the packaging of the several food items included in this film. We have included only those operations that are relatively current and sufficiently new to be of general interest.

To paraphrase the closing comments in the film, we fully anticipate the next 10 years will bring forth the answers to even greater speeds in glass packaging than we've seen to date.

Take a Look—at Your Warehouse

By P. Steele Labagh,
California Packing Corp.

One of the first lessons the American businessman learns is that industry is characteristically dynamic. Our own canning industry is certainly no exception to this rule. And one of the phases of the food processing and distributing industry which is changing at a fairly rapid rate is the warehousing of canned foods.

Of course, our problems in the field of warehousing are radically different from those facing other businesses. Perhaps, the first consideration is that the producing areas are not subject to the arbitrary selection that many industries can make, and as a corollary, the consuming areas are fairly uniformly spread. Thus, production areas are concentrated, while consuming areas are widely and evenly dispersed.

A number of years ago, warehousing by canners was not given the attention it is today, primarily because the current cost and competitive factors were not present. Warehousing has not only become a major function for canners and distributors, but the high cost of transportation service has made it essential to accomplish it with carefully arranged planning.

In recent years, there has been a rapidly growing trend for the processor or distributor to assume more and more of the responsibility for warehousing. Instead of a few orders a year, the buyer is anticipating his needs only on a short-term basis. This means that the canner is doing more and more of the warehousing.

Add this factor to the sharp increases in freight rates, and the need for efficient warehousing becomes a matter of survival. The proper program of warehouse spotting throughout the trade zone is vital in a narrowing competitive market. Thus, the policy on consolidation shipments and consolidation warehouses assumes critical importance.

Canners use a variety of warehouses in their storing and distributing functions. First of all, there's the Plant Warehouse which is located right at the processing point and is generally used for primary storage only. Canners' warehouses located at central distribution points or at points into which goods from a number of processing plants are funnelled for redistribution may be termed Consolidation Warehouses. Of course, an integral part of distribution in our country is the Public Warehouse which, as its name indicates, holds itself out as a public custodian of goods. These goods are always accepted subject to the issuance of a negotiable or non-negotiatble warehouse receipt by the warehouseman. Field Warehouses are not infrequently used today and represent public warehousing in the canner's own warehouse. A warehouseman takes custody of the goods on the distributor's premises, and warehouse receipts provide the means of obtaining pack financing. There are many other types of warehouses such as Broker's Warehouses and Dock Warehouses, but actually they fit into the classifications previously outlined.

From another standpoint we might classify storage facilities geographically. In this respect, there are three categories of storage, namely (1) production area; (2) in-transit; and (3) consumption area.

Responsibility for Warehousing

It is appropriate at this point to ask just where the responsibility for warehousing rests in the average canned foods concern. Obviously, the significance and importance of the function will vary according to the size of the organization, but certainly no consistency exists as to who exercises the control over warehousing.

An examination of firms in the food industry would show some in which the shipping department is responsible for warehousing; with others the sales department is in control; however, the production department has traditionally been in the driver's seat in other industries, and often so in the canned foods business. But as we said above, warehousing management has undergone some serious readjustments in recent years.

The current trend in the food industry is to place warehousing under the Traffic Director where specialized attention may be given to a problem of growing importance. From a subsidiary function, warehousing has become a major facet of the canning business. In many companies, a separate Distribution Department has been established to handle the goods from processing line to ultimate customer delivery. Actually, this is a very natural development since integration of the entire field of transportation within a company is dictated by needs of cost economy and efficiency. Freight charges as a percentage of delivered cost have increased sharply in recent years.

Approximately half of companies involved in a random sampling of firms placed warehousing under traffic department control. Others had arrangements where Traffic stepped out of the warehousing picture once the warehouse or warehouse site was selected. The logic of placing warehousing under the Distribution Division has been expressed by one authority as being based on the definition of storage as a transportation function since it is really "transportation temporarily arrested."

The Warehouse Itself

So much for the administrative end of warehousing. Let's look at the practical planning of a warehouse building. Of course, location is something that is studied carefully. An analysis of shipments, and a study of costs and freight rates for various locations is undertaken and the merits of these locations are evaluated. Customer convenience, ease of access, and in-transit privileges are examples of the many elements which also must be considered in choosing a site. The advisability of adopting systems stressing production area, consumption

area, or secondary (in-transit) storage must be decided as a matter of basic policy.

Canners have learned in the past decade that a warehouse is not just another building. The design of the building is critical when it comes to applying the principles of automation, and even the most fundamental material handling techniques cannot be used if building design or layout are faulty. Administration of material handling programs and warehouses run hand in hand, and what we have said before about the importance of warehousing cost advantages applies equally to material handling. We will examine the question of material handling, and offer a few concrete examples of what can be accomplished in this field of warehouse operation.

Claim Prevention

The field of claim prevention is an excellent example of what enlightened warehouse control can accomplish. The care of a warehouse crew in loading a car might be given insignificant attention with the reasoning that a claim against the carrier can be filed covering damage. Of course, claims never pay for themselves in terms of customer good will or clerical work of preparing and filing them. So attention given to claim prevention always pays dividends to both the carrier and the shipper.

A progressive warehouse operator will cooperate with carriers in making test shipments, and such research naturally pays off for both parties. In our own operation, we are constantly undertaking research on containers, loading patterns, fibre box stability, etc., in conjunction with both supplier and carriers. We have concrete evidence that these studies have paid off for all parties, and there has been continual interest in participating whenever the opportunity arises. There remains much opportunity in the field of claim prevention to reduce warehouse operating costs.

Palletizing and the Automatic Palletizer

The use of pallets in warehousing has been one of the most revolutionary advancements in the trend towards mechanized handling of stored goods, and of course the lift truck is coupled with the pallet in this regard. Canners are constantly on the outlook for methods of expanding their warehouse mechanization programs and perhaps we can discuss a few of the most recent developments that can enable an alert company to keep ahead of the field.

All of us are acquainted with the advantages of palletized handling, and we also recognize that somewhere along the line the goods have to be hand palletized. Canned foods coming off the casing lines or non-palletized in-bound shipments must be hand stacked if a warehouse is palletized. The cost of this operation, while bringing substantial subsequent savings, is heavy nonetheless. Several material handling firms have come up with an answer in the last year, and while they are still being perfected mechanically, the automatic palletizer may soon be standard warehouse equipment. Just a brief description of its operation will suffice here.

Briefly, the palletizer is fed by an ordinary case conveyor, and once the cases enter the machine the entire palletizing operation is controlled automatically. A control panel sets the pallet pattern, the number of tiers, and the size of the pallet to be loaded. Each pre-patterned tier is discharged into the automatic loading section by a special carriage which then retracts to receive the next tier. When the proper number of tiers is reached, the loaded pallet is automatically discharged from the machine and an empty pallet released from the pallet magazine. A fork lift truck is utilized to pick up loaded pallets and to keep the pallet magazine, which accommodates about 12 pallets, filled. While the machine is fully automatic, experience has shown that an attendant should be on hand to stop the machine, and coordinate flow in and out of the machine in case of stoppage.

There are a number of models on the market, but the principle of operation is the same. The rate of loading of a typical model is 37 cases per minute, and of course the real saving comes when it can be used directly off the labeling and casing lines. The savings over hand stacking are obvious, and we have estimated in preliminary studies that the machine could pay for itself over a reasonable period of time.

Clamp-type Lift Truck

So much for the palletizer. Let's look at another recent innovation. We've been talking about the effective savings in time and cost resulting from the extensive use of pallets. These savings far outweigh the cost of pallets, but pallets are costly nonetheless. So a number of equipment companies have come up with the idea of a lift truck that would eliminate the need for pallets. A clamp-type lift truck is designed with just such an objective, and over the past few years it has been used effectively in certain warehouse situations. Briefly, the clamps are installed on any standard lift truck, and hydraulic pressure against the sides of the cases permits lifting of the load.

There have been certain operational problems with the equipment, but it has proved successful in many situations. Our own experience has shown the possibilities of pallet savings both from an original investment and handling standpoint. For example, suppose we have a warehouse holding 750,000 cases at capacity. Use of the clamp lift truck would eliminate the need for 7,500 pallets at a conservative cost of 3.50 each or a total cost of $26,250. Five years seems a liberal life expectancy for a pallet which means an annual saving of $5,250 for pallets. Clamp equipment might run $7,500 but would be depreciated over a much longer life than the pallet. So even on a conservative basis, annual savings might run several thousand dollars.

But there are disadvantages. First of all, approximately 5½ inches is required between stacks for the clamps to be inserted to pick up the load. This could mean a loss in space of as much as 10 percent of a warehouse, so a square footage value on this lost space must be subtracted from the savings developed above. Also, the capacity of the clamp lift is substantially less than a palletized load. It also takes a more experienced operator to handle this equipment, and obviously it is going to be a slower operation.

We have found that the clamp lift-truck is practical in certain situations, especially where tight stacking is not practiced. For example, one of our plants found that it was a real cost saver on a pallet skimming operation that we were previously performing by hand. Also, it has proved very adaptable to pier operations which involve practically no dead storage. Here, again, we have an example of the possibilities arising from an alertness to warehouse handling problems.

Warehouse Construction for Efficiency and Economy

There are factors of efficiency and economy that are important when it comes to building a warehouse. Right from the beginning, over-all dimensions are related to increments of standard structural sizes. This does not mean that dimensions are restricted to certain sizes, but if conformity can be made to structural elements without sacrifice of serviceability, naturally, the large savings possible are realized.

Certainly, cement pillars or columns are spaced to permit economical placement of palletized stocks. Such an item must not be left to chance as it can be a major efficiency factor. Above all it calls for close cooperation between Engineering Departments and those responsible for warehouse operation. Past experience with types of buildings, construction characteristics, and other building elements should be carefully weighed in planning a warehouse. Above all, realize that one building is not as good as another.

Let's take an example of what we mean. Shape of a building is often determined by available space, but frequently there is an option avail-

able. Experience with costs teaches us that a square warehouse is less costly to construct than a long narrow building even though the square footage is identical. The three main elements of cost in a warehouse are the roof, the floor, and the walls. Roof area and floor area are roughly equal if square footage is constant, but wall area varies substantially. A long narrow building has much more wall area than a square building as the following illustration shows:

A square building 100′ by 100′ has a floor area of 10,000 square feet and a perimeter of 400 feet. A rectangular building 20′ by 500′ of the same floor area has a perimeter of 1,040 feet. Assuming a 20-foot height and wall cost of $1.50 per square foot, the total wall cost in the square building is 8,000 times $1.50 or $12,000, which is $1.20 per square foot of floor space. The equivalent rectangular building has 20,800 square feet of wall, costing $31,200, or $3.12 per square foot of warehouse space. Thus the wall cost of the rectangular building is 2.6 times that of the square building.

When leasing a building, all significant operational characteristics should be evaluated by the warehouse department in conjunction with construction experts. These should include such factors as rail and truck facilities, tax rate applicable, the current use of the building, warehouse area and capacity, construction type of building, fire protection and security, drainage around building, and insurance rating.

Let's look at another phase of the picture. Current experience with canned foods points to a usual effective maximum of four pallets high in a warehouse. Think of the increase in capacity if an additional pallet could be added, either through utilizing available cubic capacity or planning on higher ceilings from the outset of construction.

This is the sort of possibility that efficient warehouse management will investigate. Of course, additional costs of higher walls, need for more expensive lift trucks, stronger floors, possible damage to lower pallets, and danger of dropping pallet loads from a standpoint of both safety and damage to the goods require consideration. Our own company is now examining all of these factors in an analysis on four- vs. five-high stacking. The point is that these possibilities should be examined carefully, because the potential 25 percent increase in warehouse capacity under a single roof, which would result from adding an extra pallet, is too valuable to miss.

Summary of Conclusions

We have covered a variety of subjects, and it has not been intended to give an exhaustive survey of the whole field of warehousing. That would be impossible in such a short period. However, our intent has been to impress all of you with the fact that warehousing is a dynamic phase of the canning industry's operations. No longer can the storage of goods be considered a stereotyped function, but rather it must be viewed as a facet of the food processing and distribution field which offers a growing incentive for the practice of progessive and efficient management.

For this very reason, there is a marked trend toward placing the responsibility for warehousing under the direct control of top distribution executives. Industry has recognized the need for application of scientific management in the factory, but it has been a little slow in recognizing that the same principles of progessive thinking apply to a warehouse. Further, the companies that do not accept this fact will soon find themselves operating under a distinct cost disadvantage. Automation awareness and alertness to improving material handling techniques will measure the difference between proficient warehousing and a marginal operation.

We have examined a few of the recent developments in the materials handling field, and pointed out how important it is to keep up on all current innovations. These improvements in storage and handling practices can even be pioneered by a progressive canner, or at least, proven practices can be promptly adopted. The examples we have seen show the tremendous potential cost savings that may be realized.

Yes, warehousing management is dynamic by character, and resignation to the status quo is far from the real answer. The opportunities to be of real service to your companies in this field are ever-expanding. It is up to the warehouse management of each company to help keep its organization in the most forward van of progress.

Influence of Plant Layout on Materials Handling

By George Effertz,
Green Giant Company

At first thought in reading the suggested title, one gets the impression that it should be changed to the "Influence of Materials Handling on Plant Layout." The *Factory Management and Maintenance* issue of July, 1955, lists a 10-step program entitled "How to get more for your Handling Dollar." Step No. 8 is "Don't let obsolete buildings (or obsolete concepts) get in your way." They go on to state that "Plant buildings are the biggest obstacle to improved material handling—by far." In answer to the question "What are your handicaps in improving materials handling in your plant?" the following answers were in the majority:

"Multi-story; not enough space; floors inadequate; diversity of flow, and capital."

This is quoted to substantiate the fact that there are sufficient reasons why some of us are unable to take advantage of the improved materials handling methods and equipment as fast as they are being offered to us today; and that there are many occasions when this title is apt.

The ideal situation would occur when a thorough materials handling comparison study in a plant would point out that improvements in materials handling will be more than sufficient cost-wise to pay for a new, or at least remodeled plant. However, other factors such as lack of capital and expansion space often prevent us from investing more money to save money.

There should be no doubt in our minds that materials handling is a major factor in the canning industry. Many articles and papers covering this subject in other industries quote figures from 10 to 40 percent of total direct labor hours required for materials handling. In a typical corn canning plant as much as 64 percent of the total direct canning labor is required to handle material either all or most of the time. Equipment-wise, this same plant's total material handling equipment value amounts to 35 percent of total plant equipment. These figures are used to show that the canning industry has a greater opportunity than other industries to reduce total costs by conducting a thorough materials handling program in our plants.

Before going further, I should narrow the definition used for materials handling in determining the above percentages. Labor-wise, all employees directly handling corn, waste, cans, brine, boxes, labels and other supplies are included. For instance, husker and cutter operators are considered in this group. The machines perform the actual operation while the operator merely handles the corn to feed the machines. All inspectors are not included; because even though they handle waste and defects, they are performing an operation required for a finished product. So far we have heard of no machine that will perform this operation. Equipment-wise, any machine or equipment that does not add value to the product is considered to be materials handling.

In order to make a thorough systematic approach to your materials handling problem, certain steps and procedures will aid greatly as a guide to insure arriving at a better solution. Many materials handling publications and manuals are available, and I will

not take time here to present the full program, but would like to list just a few questions that can be asked in any canning plant in order to improve materials handling. The following questions can be used in studying a complete canning process, or any small operation within the process:

(1) Can the number of times the material is handled be reduced?

(2) Can any operation be eliminated to reduce distance?

(3) Does the present handling method damage or waste the product?

(4) Does the present handling method affect the quality of the finished product?

(5) Does the present handling method conform to sanitation standards?

(6) Are there any avoidable delays in the delivery of the materials to the operator?

(7) Is the present handling method dangerous and a hazard to the worker?

(8) Can the operator be relieved of handling material by the use of conveyors or jigs?

(9) Is gravity used as much as possible?

(10) Is the material being elevated mechanically more than necessary?

(11) Is the product stored at any point in the process longer than required?

(12) Are there adequate amounts of supplies such as cans, brine, etc. at each operation point?

(13) Is the handling equipment paced fast enough to utilize your present production equipment at its maximum?

(14) Does the present method cause any delays in a preceding or following operation?

Many more questions about handling can be asked, but these are the most important in a canning plant when materials handling is influenced by plant layout. Oftentimes, one of the major results of better handling is a saving of building space.

The following illustrations show how materials handling studies may or may not be influenced by present plant layouts.

Handling of Shelled Peas from Viner to Plant

There are five methods of handling to be studied and compared. Method #1 is the use of conventional lug boxes holding approximately 30 pounds of shelled peas. These lug boxes are handled manually throughout the complete operation, and dumped to the plant one at a time.

Method #2 is the use of conventional lug boxes palletized on wood pallets, unloaded and handled at the plant platform as a palletized unit of approximately 30 lug boxes per pallet. The lug boxes are handled individually when dumping to the plant.

Method #3 is the use of metal barrels holding approximately 300 pounds in conjunction with the conventional lug boxes at the viner. These barrels are loaded onto trucks individually at the viner station and unloaded, stored, and dumped individually at the plant. The only layout change required at the plant is a modification of the pea boot hopper, plus the acquisition of a barrel dumper and hand barrel trucks.

Method #4 is the use of galvanized metal-wheeled hoppers in conjunction with conventional lug boxes at the viner. Lug boxes are used to collect the peas, and are dumped at the individual vining stations into hoppers which will hold aproximately 1,000 pounds. These hoppers are pushed by one man onto trucks and are handled in the same manner at the plant platform. The bottom of the hopper is built to provide gravity flow into the stationary pea boot hopper, without the full-time attendance of an employee.

Method #5 is the use of hoppers only. This requires extensive mechanical conveyor equipment at the viners which will automatically load the hoppers. They are then handled in the same manner as Method #4.

A study of these five methods in regard to the man-handling per thousand pounds of peas shows a comparative result as follows: Method #1 requires 275 handlings: #2 requires 211; #3 requires 93; #4 requires 75; and #5 requires only 10.

As to the factor of product waste and damage, Method #1 produces the highest loss, with the others decreasing in the order listed to #5 which produces a negligible amount of damage and waste.

As to the effect on quality, there appears to be no difference in any of the methods providing holding time is not excessive; holding time being the time required between the time vined and the time dumped to the plant.

As for capital investment, Method #1 will require the least and Method #2 requires some which is usually justifiable. Methods #3, 4, and 5 require increasingly more capital, with #5 requiring considerably the most.

As far as layout changes are concerned, Methods #1 and 2 require none; #3 requires a slight change, with #4 and #5 requiring the most. All methods have been tried and proved for a number of years with the exception of #3 having but one year's trial by our company.

A sixth method is also being used in some plants. The viners are stationed at the plant site, and are elevated to the degree that the shelled peas are flumed to and through the plant. I have not used this method for comparison because we do not have all necessary information. However, it certainly appears to have many advantages as far as materials handling is concerned. This method definitely would be influenced by your plant layout.

In regard to causing delays in preceding and succeeding operations, Methods #1 and #2 have proved to cause delays in the trucking operation or in a successive operation. Method #3 should eliminate delays in trucking, but may cause some delays in following operations, depending upon whether suitable equipment is fast enough to accommodate the pace of the plant. Methods #4 and #5 have proved to be the most efficient in this respect.

This study points out the variation in different factors for each method considered. Hoppers prove to be by far the most efficient labor-wise, and in preventing product damage or loss. However, this method requires the greatest capital investment and layout change. In order to fit the merits of each method to an individual plant, present layout, balanced between savings and expenditures, will determine which method will prove the most economical. It is true that in an individual case, the complete hopper system #5 may require very little change in layout, but in all cases will require considerable investment at the viners, as well as the plant. In designing a completely new layout, the cost of obsolescence of mechanically sound, but outmoded equipment should be considered as a factor which will offset savings.

This illustration, I believe, could very easily be a case of plant layout influencing materials handling. This change alone may not suffice for reasons of a complete new layout, but in conjunction with other layout change advantages could possibly warrant a complete plant layout remodel.

Handling of Green Corn from Field to Plant

The four handling methods used in this study are as follows:

Method #1 is the use of a tractor-towed rubber-tired trailer into which the picked corn is conveyed from the field, and then hauled to the plant where it is stored until ready to be dumped. The unloading of these trailers will be performed by the conventional method of mechanically hoisting the front end of the trailer and manually hooking the corn out of the trailer.

Method #2 is the use of trucks in the field to receive the picked corn and to haul it to the plant where it is reloaded to wagons by the use of a hoist, and men hooking to a conveyor. These wagons are then stored until time for dumping to the plant.

Method #3 is the use of pallet bins placed on a flat-bedded truck with the use of a fork lift tractor. These pallet bins would receive the corn in the fields as it is picked, and would be used in hauling to the plant, where a fork truck would unload and place it in storage until ready for dumping.

A fork truck is also required to transport and dump to a conventional conveyor.

Method #4 would be the use of dump trucks for receiving the picked corn in the field and hauling to the plant where it is dumped without hooking to a concrete platform for temporary storage. A modified tractor pusher is used to push the corn into a below-surface level conveyor carrying it into the plant.

The results of a materials handling study of these various methods in regard to labor requirements are as follows: 66 for Method #1; 42 for Method #2; 34 for Method #3; and 33 for Method #4. As to product waste or damage, Method #2 shows the most damage; as it is manually hooked twice. Method #1 shows a decrease in damage because it is manually hooked only once. Methods #3 and #4 show little handling damage at all. As far as capital investment is concerned, Method #2 requires the least amount; Method #1 requires considerably more; Method #4 requires still more; and Method #3 requires the highest amount. As for any required layout change, Method #2 requires none; Method #4 would require the most change, but would result in a savings of required space. As far as methods being tried and proved, Methods #1, #2, and #4 have been tried and proved, whereas #3 has been for other commodities, but not for sweet corn as far as we know.

As far as causing delays in other departments, #4 gives the least amount of delay and Method #2 the most.

This green corn handling is a good illustration of how materials handling may be improved without requiring a major plant layout change or more land space. The use of dump trucks in conjunction with a tractor-pusher method and a concrete platform proves to be the most efficient labor-wise, damage-wise, space-wise, and requires less capital than the pallet bin method. The only obstacle to making use of this method over conventional is lack of capital; and studies at most plants could possibly prove that savings would offset investment in the required period of time.

Handling of Peas in the Processing Plant

One of the answers to the questions on materials handling referred to previously in the July issue of *Factory Management and Maintenance* resulted in quite a few answers that "Multi-story buildings were handicaps to an improved materials handling program." This is true in many industries, but does not apply in general to the processing of peas. Usually a materials handling study will prove that the best methods will require a multi-story building.

The mechanical elevation of peas may be damaging, and also affect the quality of the product. In order to eliminate the number of elevations, it is no doubt more effective to elevate at an early stage of the process and let gravity take care of every other stage of handling between process operations. It is inconceivable, in practically all cases, to estimate how a multi-story building would be a handicap in any degree. It may be necessary to alter your layout slightly, but we find in most studies that the most efficient handling system laborwise will also result in improved quality and less building space.

In studying the handling of sugar and salt used for brine, it is apparent that plant layout is the major factor in influencing the best materials handling. You have, no doubt, been aware of the many advantages to be gained by using a large portable bin for all handlings of sugar and salt. The method results in the elimination of many manual handlings, and it appears very favorable in regard to sanitation, equipment, and other factors. We would also save considerable handling and improve working conditions if sugar and salt could be palletized from the refining plants to you and handled all the way as a unit of 12 or 15 bags per pallet. The second method may not show as many savings as the bin method, but has many advantages over the single sack handling method. Both of these methods are handicapped by plant layout. I am sure there are many canners who would have gone to either of these methods in the past few years were it not for this limitation.

The handling of empty cans is another operation which may be a fertile field for improved handling. We have found, and I am sure you will agree it is easy to substantiate, that if cans can be handled in larger units than the present handling of 12 or 15 at a time, we reduce labor, delays, and damage to cans. However, in order to utilize and improve this operation, layouts may have to be changed and possibly more space is required. As cans are conventionally and largely handled in bulk at present, all unloading operations are performed in the freight cars themselves, and require very little or no plant space. In order to handle cans in larger units, either fork trucks or other more costly equipment is required. The layout of your plant may limit the use of fork trucks for cans, and, other equipment considered, would require a considerable change in your present layout. However, I would like to state, again, that can handling should be a good source of improved materials handling.

In the processing of products other than peas, one must not overlook the opportunity to eliminate or correct causes of damage or waste to the product in the handling system within the plant itself. Conventional handling systems are being improved continuously; and if we look only for labor or equipment savings, we may overlook the great possibilities at the same time of reducing damage or waste. Methods of washing or cleaning such commodities as sweet corn, tomatoes, string beans, and other products highly susceptible to handling damage are being improved. These improvements result usually in less handling and less space required. For instance, in a sweet corn operation successful materials handling improvements in the past five years have resulted in a decrease of 26 percent handling, and 24 percent less distance in the material travel in a given plant. These savings were gained at the same time that a reduction in damage to the product was also effected. The labor savings amount to an increase in cases per material handling wage-hour of approximately 35 percent. All of these improvements required a great change in plant layout, but resulted in less space requirements. Therefore, lack of expansion space is no drawback, but considerable capital is required.

To summarize: Your present plant layout may be the determining factor in your being able to take advantage of materials handling improvements. However, there is a strong possibility that if a materials handling program is used to its fullest in every department, you may produce sufficient economies to justify a complete layout change so that materials handling will influence your layout rather than having layout influencing materials handling.

Status and Prospects of Radiation Preservation of Foods

By Col. W. D. Jackson, Office of The Quartermaster General, Dept. of the Army

In discussing this fascinating research program of radiation preservation of foods, I would like to draw on some personal experience in the feeding of troops in combat. Our purpose in the Quartermaster Corps is to alleviate the hardships of the soldier, particularly those in combat, so as to make him more capable and efficient.

With this in mind let us go back to the year of 1950, when I was in charge of subsistence logistics in the Eighth Army in Japan. Let us look at the pressures and the objectives that motivate the actions of a subsistence officer in time of military action.

At the outset of the Korean hostilities in July, 1950, our first objective was to mount out the divisions located

of subsistence logistics in the Eighth in Japan for immediate combat in Korea. We had to rely on nonperishable food items under these conditions. The combat soldier was given C rations and a B ration, which is a fairly good meal plan of limited variety consisting entirely of canned and other nonperishable items.

Under the stress of those days the soldier of necessity had to be satisfied with those items. Refrigeration distribution facilities in Korea were practically non-existent. While we were constructing a portable bread bakery in Pusan, we tried to ship fresh bread from Moji on the island of Kyushu. The ferry run took 12 hours. The much needed bread reached the front line troops several days after baking. As this was the rainy season, the weather was hot and humid, and all of the bread arrived covered with mold. We tried baking the bread longer; we adjusted the formula, but the mold spores won out. We were forced to stop shipping bread. If we had been able to extend the shelf life by one week we could have successfully delivered the bread. We tried substituting locally prepared biscuits but we could not keep up with this new demand for baking powder and oven space. The combat soldier was forced to get along on these limited supplies, due to our inability to distribute short shelf life product.

I recall that even with the availability of refrigerated facilities in Japan we found that time and time again we were able to ship produce only to the supply point from where they were to be delivered to the final kitchen where they were to be assembled into meals. At that point rot set in and the perishables had indeed perished. The thought haunted me frequently, how could we possibly extend the refrigeration shelf life? If we could only have doubled it we would have made the difference between hundreds of thousands of men having and not having fresh food.

When we had to rely only on foods preserved using present methods, an element of monotony was introduced. If only we can improve its flavor and its texture, how much greater satisfaction can be extended our men. Looking back to our warehouses we find in some of our far-flung areas tons of potatoes are beginning to sprout on us, we find tons of flour infested with insects. We had to eliminate cereal bars from our rations. We had to destroy much needed food because of infestation. If there was some way of overcoming this large loss, we would be able to alleviate the tax burden on our relatives back home.

This is a very rough thumbnail sketch of the flashes of concern that came to the minds of military subsistence people during those days. We left with the firm resolution in our minds that we must explore every avenue which promised to prevent recurrence of this type of hardship.

In the meantime, during the Korean fighting and prior to that situation, scientists were contributing to the process, begun perhaps with the discovery of cathode rays in 1859 and radioactivity in 1895, which contained potentialities for the development of a new and unique process of food preservation. In 1904 in this country Samuel Prescott had published a dissertation on the influence of radium rays on the colon bacillus, the diphtheria bacillus and yeast. And it was in 1947 when experimental data were actually published in the scientific literature by A. Brasch and W. Huber of the Electronized Chemical Corporation of Brooklyn. Their paper was quickly followed by a series beginning in 1948 from the Massachusetts Institute of Technology.

Type of Process

By this time it was clear that as a result of all this research a new and technically feasible process was with us, that foods as well as drugs could be treated electronically in such ways as to sterilize, pasteurize or otherwise aid in the extension of their edible life. The process became known under many different names, one of the most accurate being radiation preservation of foods. In this new type of preservation, without heat, many new factors must be considered. Some of these are the same or similar to those encountered in present methods of heat sterilization or preservation of canned foods. Others are different due to the inherently different nature of the processes involved. The chief characteristic of the process is an extremely small rise in temperature, a degree or so, during the process of sterilization. The nature of the process is basically different from heat sterilization and this is illustrated by the fact that while enzymes are more easily inactivated by heat than are bacteria, the reverse is true when they are subjected to the process of irradiation. In the latter case, enzymes require 10 times or more the radiation intensity necessary to destroy bacteria. It therefore devolved upon anyone interested in the potentialities of this new process to study the factors, old or new, inherent in the process of radiation pasteurization. It is, I think, already clear at this point that there will be some impact upon the older methods of preservation including both canning and freezing. As to how great this impact will be, its timing and its action on or interaction with the established processes, it is one of the purposes of our discussion to examine. It is, of course, to the interest of the canning industry to keep current on these matters.

Military and Civilian Interests

At this point, a word about the interest of the armed forces, who have spearheaded the technological attack on this new method of preserving food. How did they become interested and why did they become interested in committing an important segment of their food research energies in this field? In the first place, the U. S. armed forces are the world's largest buyers of subsistence items. Total Department of Defense subsistence procurement (excluding local Navy purchases) were over $4 billion ($1.75 billion in perishables) in 1945 with a peacetime low of $500 million (over $250 million in perishables) in 1950. Army procurement of meats, a perishable item, in wartime reached about 2¾ billion pounds of fresh meat and ¾ billion pounds of canned meat in 1944; consider the opportunity and need here for a process that would aid in more easily handling the perishable items alone. Now, it is estimated that during World War II with 5,000,000 men overseas, the additional cost of transporting perishable foods over that of nonperishable foods came to $200 million. Any technique that would reduce this cost either through a more economical method of preserving foods or a supplement to or replacement of the present system of refrigerating foods would be eagerly received.

In the second place, the supply system for the armed forces is geographically extensive. Supplying perishables to overseas areas involves warehouses, railroad reefer cars, refrigerator ships, trucks, and trailers. Radiation processing could relieve the congestion of machinery-laden naval vessels and ameliorate the expense of static refrigerated facilities.

And finally, food quality or quantity is a controlling factor in the success of many tactical operations. For example, reduction in the frequency of resupplying warships with perishables would increase their cruising range—particularly in the case of nuclear-powered vessels.

These then are the reasons why the armed forces are studying radiation sterilization of foods, but there are other reasons besides improving military logistics why the process of ionizing foods is being pursued with vigor.

First, there are public health benefits to be derived from this new and unique weapon in the fight against food-borne diseases. Trichinosis, a widespread disease in the U. S., found particularly in pork, appears, from recent work, to be vulnerable to destruction by gamma or beta radiation. Also, there are potentially massive contributions which could help satisfy the ever-increasing demands of mankind for food particularly through reductions of losses during storage and shipment of foods. Furthermore, this method of preservation not only overlaps and supplements conventionally preserved products but, recent research has demonstrated, has certain unique applications. The extension of

the storage life of potatoes and the deinfestation of grain and flour are examples.

Here also is another possible contribution to the dynamic growth of the national economy and increasing standards of living. The remarkable increase in percentage of income lavished by the American housewife on foods has a twin inspiration. First, she will pay for greater ease of preparation and, secondly, for improved quality. This trend started with the invention of the art of canning by Appert and the subsequent improvement and elaboration of the process has resulted in an enormous saving of labor for the housewife and improvement in the nutrition of the family. This trend has extended into other fields with the development of frozen-processed meals and ready-to-bake goods, and now irradiation of food, either alone or in partnership with these processes and products, or both, shows much promise in contributing to future advances. It may be that the taste of some canned foods will be significantly improved through replacement of heat or, more likely, partial replacement of heat by cold irradiation. There are also possibilities of superior retention of nutrients. In the area of ready-to-bake goods, irradiation may drastically reduce or eliminate the necessity for refrigerated handling, thereby greatly facilitating their distribution. And so we see the military and civilian implications of this program.

Armed Forces Responsibility

The responsibility of effecting this program lies with the Army, which through the Quartermaster Corps and an external contractual program involving universities, foundations and other outside sources, supplies the food technology and, with the cooperation of the Atomic Energy Commission, handles radiation technology. Other government agencies, such as the Office of the Surgeon General, the U. S. Department of Agriculture and the Food and Drug Administration, are participating in the activities through various advisory committees as well as the food industry itself.

We of the Quartermaster Corps are attempting to expedite the research and development of this new and unique process to the point that American industry can assume responsibility as soon as possible. We know that there must be wide industrial participation for the military to benefit fully. Therefore we have driven toward this goal from the very beginnings of this project. We have done most of the work by contracts in order to spread the know-how. We have activated extensive means of release of information to the public. We have been working closely with industry. We anticipate the point when the Army can step back and let American industry take the lead in this area.

Status of Program

But, you say, where do we stand today? What do we know regarding the fundamental qualities that every food processing technique must possess in order to be commercially feasible? We know that there are four prerequisites that the radiation processing of foods must satisfy. Let us discuss them one by one and relate each to pertinent data and facts uncovered during the course of accomplished experimental work.

First, will this sterilizing process actually kill microorganisms? There is no question but that all life can be destroyed using this process providing a sufficiently high dosage is used. In general, the lower in the evolutionary scale, the higher the dosage required. The simpler the organisms, the less sensitive it is to radiation damage. Thus, while insects can resist only a twentieth of the lethal dosage for microorganisms, man can stand only a thousandth. These dosages vary from 2,000,000 reps for the complete sterilization of foods to 200,000 reps where a sort of pasteurization and an increased shelf life of foods is obtained. It is possible to destroy trichina in pork and insects in flour at 30,000 reps and at 12,000 reps or thereabouts potatoes and onions are inhibited from sprouting. Thus, we see that we have met the first condition. The contaminating organisms can be destroyed at attainable dosages.

Secondly, what about the toxicity of the irradiated food? Is it wholesome for human nutrition? It is necessary to take a conservative approach toward evaluating the wholesomeness of irradiated foods. All experiments to date indicate the fitness of irradiated food for human consumption. However, a vast amount of future work remains to be done. It is necessary to avoid conclusions until extensive and thorough examinations have been made because of the large numbers of people that will be affected if the process is ultimately successful. The Food and Drug Administration and the Office of the Surgeon General share this view and are working with us on the problem. From the results so far we may conclude that no radioactivity is induced in foods by the beta and gamma sources used. So far the most sensitive instruments have not been able to detect any induced radioactivity. In fact, in one series of tests 24 of the most common elements found in foods that might be susceptible to induced radioactivity were individually subjected to food type irradiation by cobalt 60 with negative results. So far there has been no evidence to indicate that irradiated foods are toxic. Independent studies have been conducted at many laboratories. In one test alone, about 3,000 animals were followed over three generations, including gross as well as 2,600 detailed histopathological examinations. Forty foods have been examined using rats as test animals on our 8-week sub-acute toxicity test with satisfactory results. Studies have been initiated to be carried through four generations of rats and another species of animal. Results will be noted on food consumption, growth, lactation, size of litter, viability of young and longevity. Histopathological examinations will be made. Furthermore, two preliminary three-week controlled human feeding tests at the Army's Medical Nutrition Laboratory have been completed with no differences whatsoever between the volunteers fed irradiated and those fed unirradiated foods. In these tests 35 percent of the diet was irradiated. We plan to raise the level to 70 percent in the next series.

However, there is some loss in nutritional value in some instances. The vitamin content of certain foods is decreased by sterilizing doses of radiation. In such cases we note that the growth curve of the animals fed irradiated foods eventually drops slightly below that of the control. This loss in nutritional value is not a sign of toxicity. Also, it is a characteristic of other methods of food preservation.

Thirdly, the treatment must not adversely affect taste, texture, odor and appearance of foods. Owing to the nature of the process we are discussing, we can predict that there will be some effect. The chemical change, induced in bacteria by the lethal rays, is not selective and other changes are induced in the food which are similar. The amount of these changes is small but sometimes quite noticeable. We find that different foods vary in their response to ionizing radiations as far as these characteristics are concerned. Milk, for example, will develop undesirable flavor changes at 100,000 reps while dried prunes were reported to be capable of withstanding over 3,000,000 reps. With dosages up to the 30,000 rep level for destruction of liver flukes, trichina and such parasites, only a few foods were adversely affected. With a pasteurizing dose of 200,000 reps (about 10 percent of the sterilization dose), we find foods such as bananas, crab meat, oranges, strawberries, butter, milk and cheese developing undesirable odors and flavors. On the other hand, there are other foods that are not adversely affected, such as luncheon meats, pork, ham, carrots, coleslaw, peas, and mackerel. Even at sterilizing doses we find quite a number of foods with either no detectable changes or of such a small degree that there is reason to believe that they can be overcome with some study. Examples are asparagus, bacon, spinach, beef liver, broccoli, green beans, chicken, codfish cakes, corned beef, halibut, ham, pork, pork sausage, carrots, sweet potatoes, waffles. There are of course possibilities in certain formulated foods, such as pork and beans. There are other foods with which more work needs to

be done before they can be sterilized without undesirable flavor changes, such as beef, lamb, frankfurters, spinach, and veal. The technical data that is available to us on these matters is still in the developing stage. Due to different laboratory procedures and methods of irradiation there are some apparent contradictions in results. Furthermore, the production of off-odors and flavors is influenced by the presence of oxygen, antioxidants, free radical acceptors and the temperature of the food being irradiated.

Related to this matter of taste and appearance, there is an important issue which is still under consideration. This is concerned with the problem of enzyme inactivation. We all know how important it is to any preserving process to control these natural catalysts of processes that cause off-colors, odors, and loss of texture. These enzymes are not inactivated by the 2 to 3,000,000 reps which are sufficient to kill microorganisms and which is a level at which off-odors and flavors frequently appear. Some are resistant to 10,000,000 reps or higher. We must determine if these enzymes will continue to degrade the food in storage even after destruction of the microorganisms. We have not fully investigated this yet but it may be that we will have to invoke other methods of enzyme inactivation, such as the use of a minimum heat or blanching treatment.

Finally, the process must be economically practicable. At the present time little is known about this subject. Much of the uncertainty here is directly related to the uncertaintv surrounding the cost of a radiation source. Pertinent information will be obtained via pilot plant processing 1,000 tons of food a month which is scheduled for operation by the Department of the Armv in 1958. An economic analysis will be made by North American Aviation under the same auspices, but this will not be completed until next year. We know now, of course, that we will use beta (cathode) rays and/or gamma (X-rays), with their superior penetrating ranges, but how shall these be generated? We can hope to establish a partnership with central nuclear power developments by using certain surplus energy sources in such a manner as to utilize a by-product not now in demand. In this way we could use spent fuel assemblies, separation of the gamma emitting isotopes cesium 137 and strontium 90 from the shorter life waste fission products, gaseous fission products from the homogeneous reactor (this would require processing at the reactor site) or a reactor made isotope such as cobalt 60. Each of these sources has advantages and disadvantages. We are trying to narrow the choice for the best production source. Somewhat less uncertain are our figures using electron accelerators. In fact, for foods less than three inches thick there is reason to believe that this would be the method of choice. But for larger sizes, No. 10 cans for example, it is desirable to use the more penetrating gamma rays. There have, of course, been some cost estimates made for food irradiation using gamma irradiation reactors, linear accelerators or fission products. These guesses run as follows:

For sprout inhibition	0.14 to $5.00 per ton
For grain deinfestation	0.10 to $1.00 per ton
For meat sterilization	0.3 to 7 cents per lb.

These figures are the best guess of people familiar with the areas involved and should be within range, at least, of reality. Experienced canners or frozen food packers can compare this with the costs in their industry. If comparable costs of the frozen food industry is 2 to 3.5 cents per pound and the cost of retorting and processing canned foods is 0.15 to 0.5 cents per pound for vegetables and 0.8 to 5.0 cents per pound for meat and if we can assume the normal contributions of development engineering and its beneficent result on unit costs, then there is room for optimism indeed.

And so, I think, you have an answer to the question as to how far along is this method of preserving food. We see that there are many problems, that it is still in the development stage, but that progress in the past three years has been at such a rapid rate as to encourage those of us who are closely connected to this work and to develop a feeling of optimism even greater than that previously felt.

Food Processing Methods of the Future

Before closing, I should like to discuss briefly the effect on the processing methods of the future. There are, of course, large amounts of capital involved in the buildings and equipment now in use and, fortunately, it is most unlikely that drastic changes will be required. It can be assumed that ordinarily the product will be handled normally and ordinarily be packaged prior to being subjected to ionizing rays. Present technology envisages that a rather small area will be required for beta or gamma sources, which would replace the retorts or freezing units. The irradiation would take a few seconds when electron accelerators are used and possibly 10-15 minutes using more typically sized food packages in cans, and gamma radiation. Of course, it is possible, and layouts have been outlined, where the radiation would take place prior to the filler and canning operation using the aseptic method of processing and using heat perhaps to sterilize containers and can lids. Then too the sequence of the processing steps will depend on the type of treatment required. If the product is to be sterilized but not cooked, the source of irradiation can be substituted for the retort in the line after the can sealing machine and, of course, followed by the exterior live steam can washer. If, however, the product is to be cooked just sufficiently for optimum taste and texture or to inactivate enzymes rather than at conventional sterilizing temperatures, then the ionizing source could be placed before or after the retort. Whether or not there is a choice in this case is not yet known.

Where so-called pasteurization is to take place on products such as spinach, irradiation can follow the packaging operation after the washing and blanching operations.

The de-infestation of grain or flour, the destruction of trichina in pork and the prevention of sprouting of potatoes are not expected to present any extraordinary difficulties.

We see then that the irradiation process will not significantly disrupt the food processing line. We must remember that in spite of the many sketches and diagrams that have appeared, no food processing pilot plant using irradiation has yet been built or even designed. The Department of the Army is hopeful of having a facility ready to process 1,000 tons per month by 1958. Only after experience with its operation will we have a sound basis for estimating the feasibility of the process. It appears at present that no unusual storage problems will be encountered. Conventional methods of handling, storage and shipment should be satisfactory. No new or increased amounts of equipment appear necessary. This is also true regarding packaging materials although some consideration must be given to the best material for the different treatments. For the sterilization of fresh meats and vegetables, films which are impermeable to water and oxygen, resistant to 2 to 3,000,000 reps of beta and gamma rays, and of sufficient durability are needed. There are commercial films available today which meet the minimum requirement. Here too we may expect that time is on our side and improvements will develop. For the radiation sterilization of foods canned in standard tin cans, the resistance of the package to heat must also be considered. It is probable that for this purpose the present cans may remain in use. The fact that they absorb a significantly greater fraction of the radiant energy due to their greater density than do cans of aluminum or plastic films may require further examination.

And so, it is apparent that much remains to be done before radiation sterilization of foods becomes a commercial reality. There are various scientific and technological questions for which solutions must be found. Among those not previously discussed are the methods of measuring the dosage of radiation received in foods, shielding requirements around the radiation source and radiological safety monitoring devices and prac-

tices. Satisfactory answers should and it is hoped will be obtained.

Concluding Statement

One cannot be conversant with the operations of this program without developing an optimism concerning the future use of ionizing radiation, including ionizing sterilization, in the food industry. There are great benefits to be realized by us and by the inhabitants of other countries from the successful completion of this program. But great also are the technical problems to be solved. However, the results of the research efforts of the last three years have been very successful, and commercial applications of radiation in one form or another to some phase of the food industry are closer than most people realize.

The day is dawning when, by means of this new process, the canning industry will be in a position to add to their present challenges and take on expanded business. This could well mean processing a sizable fraction of the massive amounts of perishables that are now exposed to storage and distribution losses and thereby increasing the quantity and quality of foodstuffs available to a hungry world. It is a very humanitarian purpose and I am happy to invite your attention to this exciting and good venture.

AGRICULTURAL RESEARCH

Presiding: C. H. Mahoney, Director, Raw Products Research Bureau, N.C.A.

Address: "Fruit and Vegetable Research of Interest to Canners"—Frank P. Cullinan, Chief of the Horticultural Crops Research Branch, Agricultural Research Service, USDA, Plant Industry Station, Beltsville, Md.

Address: "The Agricultural Engineering Research Program of the U. S. Department of Agriculture"—E. G. McKibben, Chief of the Agricultural Engineering Research Branch, Agricultural Research Service, USDA, Plant Industry Station, Beltsville, Md.

Address: "Soil and Water Conservation Research Aids Plant Production"—W. W. Pate, Assistant Chief of the Soil and Water Conservation Research Branch, USDA, Plant Industry Station, Beltsville, Md.

Vegetable and Fruit Research of Interest to Canners

By Dr. Frank P. Cullinan,
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I am glad to have this opportunity to tell you about some of the research carried on in the Horticultural Crops Research Branch of the Agricultural Research Service. I know that in the last analysis the processor of horticultural crops is interested in the quality of the final product as it comes from the can, but he is necessarily interested also in the raw stock as it comes from the field to the factory for processing. I am equally certain that the producer of the crops for canning is interested in factors that affect yield and economy of production of the fruits or vegetables to be processed. In this discussion I shall consider in the broad aspects some of these factors of improvement, production, and disease control.

Our main objective in public service research is to find ways of making horticultural enterprises pay more dollars per unit of investment. We try to reach this goal for the farmer by finding ways for him to get higher yields per acre of land and per hour of labor. It may be achieved also by increasing the suitability of crops for machine production, harvesting, storage, and processing. The direction of horticultural research, as of all other plant research, is set largely by the pressure of economics.

Diseases annually take a heavy toll of horticultural crops and when epidemic they also make yields undependable. A few years ago the United States Department of Agriculture made a comprehensive survey of plant disease losses in the United States. It is rather difficult to get a direct measure of such losses. A careful appraisal indicated that producers of all perishable horticultural crops were losing an average of 16 cents of each dollar of potential income as the result of disease. Diseases of some crops are more costly than those of others. For example, losses in two fruit crops, sour cherries and cranberries, averaged more than 20 percent. But diseases took more than one-fifth of the production of seven vegetable crops—snap beans, cucumbers, peas, peppers, potatoes, shallots, and spinach. About one-fourth of our potential production of current acreage of commercial tomatoes is lost as a result of diseases.

One of the ways research may help to cut down losses is producing new varieties resistant to these costly diseases or finding some means of control through use of chemicals or specific methods of culture and management of crops and soils.

Research in the Horticultural Crops Research Branch of the Department of particular interest to canners is focused on:

(1) Crop improvement through breeding to develop high-quality disease-resistant or disease-tolerant varieties.

(2) Disease control by chemical or biological methods.

(3) Nematode research.

(4) Introduction of new plants, varieties, and species that may contain genes for disease resistance and that can be utilized in breeding programs.

The work is now carried on from central headquarters at Beltsville, Md., and in 26 field locations in cooperation with State Agricultural Experiment Stations.

Horticultural Crops with Hybrid Vigor

Yields of some horticultural crops have been stepped up in recent years through the utilization of hybrid seed. This is a well-established practice with field corn and sweet corn. With onions spectacular progress has been made through the use of male-sterile lines in developing F_1 hybrids. The factor for male sterility discovered in an onion variety in California 30 years ago by Dr. H. A. Jones, who is in charge of our onion breeding program, has now been incorporated into all important onion types. As a result of the breeding program that has been in progress during the past 20 years, the Department, in cooperation with State Agricultural Experiment Stations, has developed and introduced a number of hybrid onion varieties. Seedsmen have been supplied with basic lines carrying the pollen-sterile factor for their breeding programs, and they in turn have developed other hybrids.

Onion production in the Rio Grande Valley of Texas was seriously curtailed on some farms because of pink root. New hybrids and varieties have been developed that are resistant to this trouble.

Hybrid onions are rapidly replacing older varieties. The new hybrids not only produce much heavier yields, but

also bulbs that are more uniform in size and shape. The firm flesh of many hybrids makes them more suitable than older varieties for mechanical harvesting and bulk storage. While most of these hybrids are for the fresh trade, there does not appear to be any reason why equally good varieties could not be developed for processed products if there were sufficient demand for them.

Another crop in which hybrid vigor will be used to boost yields in the near future is spinach. During the past several years we have carried on a spinach breeding program at Beltsville with the field work in the Southwest. From this work a new variety called Early Hybrid 7 has just been released to seedsmen and growers. The seed parent of this hybrid is a smooth-leaf Viroflay type spinach immune from blue mold(downy mildew). The pollen parent is the savoy-leaf variety Virginia Savoy, which is resistant to blight (yellows). Resistance to blue mold and to blight is each conditioned by a single dominant gene so that the hybrid is resistant to both of these diseases; and in addition—because of hybrid vigor—this new hybrid will out yield either parent.

Early Hybrid 7 is a rapid-growing, easy-bolting type but, when it is grown during the cool short days of autumn and winter in the South, bolting is suppressed and excellent vegetative growth is obtained. The leaf of the hybrid is semi-savoy and satisfactory for canning and freezing, but is not generally acceptable for fresh shipment. In the summer of 1955 seed of Early Hybrid 7 was increased at Mount Vernon, Wash. About 20,000 pounds of seed were harvested, distributed, and planted as a fall crop in the South. In December 1955 about 890 pounds of foundation seed of the seed parent were distributed to seedsmen. Some of this will undoubtedly be used for maintenance, but there still should be enough remaining to produce about 100,000 pounds of seed for planting in the fall of 1956.

The female parent of this hybrid produces only strictly male (pollen) and female (seed) plants—no bisexual plants. Seed of the hybrid is produced by planting 4 rows of the female parent to one row of the pollen parent. All of the male plants are removed from the female parent rows before the flowers open. Pollen is distributed by wind from the pollen row to the seed rows. When pollination is completed the pollen row is destroyed. There is no serious seed production problem because seed yields have been heavier than on the old standard varieties. The big cost in the production of hybrid seed is roguing the males, which makes the cost of seed 3½ to 4 times that of the old standard varieties. However, there has been no hesitancy in purchasing seed because of its cost.

We believe this spinach program, begun in a modest way, is a good example of an achievement made possible by the cooperative effort of a number of interested agencies (the American Refrigerator Transit Company, the American Can Company, the California Packing Corporation, the Texas Agricultural Experiment Station, and the U. S. Department of Agriculture).

Disease-Resistant Varieties of Beans

Snap beans are another important vegetable used for processing. In the different producing regions of this country green bush beans are susceptible to many fungus, bacterial, and virus diseases that reduce yields or limit production. More than 50 diseases have been reported to attack beans.

The main objective of our bean improvement program has been to develop disease-resistant lines and then by well-established breeding methods to produce disease-resistant varieties for release to seedsmen. Research is being carried on regionally at five centers (1) Central headquarters at Beltsville, Md.; (2) the Southern Vegetable Breeding Laboratory at Charleston, S. C.; and field stations in (3) Greeley, Colo.; (4) Twin Falls, Idaho, in the great seed-bean-producing region; and (5) Prosser, Wash., where the virus disease "curly top" is present every year and where our work on this disease is centered.

We now have good varieties with resistance to common bean mosaic virus, the New York 15 strain of mosaic virus, and pod mottle virus. Of course to find resistance is only the beginning in a long-time breeding program, but it is necessary and important to find that resistance. To date no bush snap bean that possesses resistance to curly top has been produced, but marked progress has been made in developing lines that have resistance to that disease as well as to other diseases. For example, we have a number of common-bean-mosaic-resistant lines with slender dark-green pods and others with slender medium-green pods. All are good producers and have a concentrated pod set apparently adapted to mechanical harvesting. Seed of one of the most promising lines will be increased in 1956 and possibly released to the seed trade the following year.

We recognize that it is highly desirable to release varieties that have multiple resistance, that is, resistance to a number of diseases. Southern bean mosaic is a serious virus disease that malforms the pods and makes them unfit for processing. Fortunately this disease is not widespread at present, and we have some lines that are resistant to it. In addition, we are attempting to produce disease-resistant white- and green-seeded types that will be especially suitable for processing. We are encouraged with the results obtained in our bean-breeding program. Within the next few years we expect to release to seedsmen other bean varieties, particularly white-seeded types, that carry multiple disease resistance.

Lima Beans

Downy mildew causes heavy losses to lima beans, particularly here in the Middle Atlantic States. Resistant lines have been found in selections brought in from abroad and crossed with the susceptible Fordhook 242, Concentrated Fordhook, and Early Thorogreen. White- and green-seeded bush types are being selected from the promising progeny of these crosses.

Three downy-mildew-resistant Thorogreen types that have been in small field trials and found to possess excellent processing qualities will be increased in the West this year. These lines will be tested again in large processing trials in 1956, and the superior line will be released to the seed trade.

Several excellent green-seeded lines of the Fordhook type also immune from downy mildew have been developed. It will take several more years of testing processing lines before the most outstanding of this group is selected for release.

Tomatoes

Tomatoes are another canning crop that has received considerable attention from State and Federal research over the past years. Here again the objective in our work has been to develop high-quality disease-resistant varieties. A new plum-shaped paste-type tomato, highly resistant to fusarium wilt and having high yield and processing quality, was released last year to seedsmen under the name Roma. Two verticillium-resistant varieties of tomato, Loran Blood and VR Moscow, resulting from our cooperative program in Utah, have become the leading varieties for processing in the inter-mountain tomato districts. Since we have obtained resistance to a number of tomato diseases such as fusarium wilt and verticillium wilt, we feel that any varieties introduced in the future should possess resistance to these diseases.

Another problem of tomato production that concerns canners is the cracking of the skin and flesh near the stem end of many varieties. This trouble is much worse in some seasons and in some locations than in others. If non-cracking characters can be located in some parent, either from the wild or from breeding progenies, and introduced into our best tomato varieties of today or in other equally good varieties developed in the future, it will be a big advance in tomato im-

provement. It will also constitute a saving for the processor.

Sweetpotatoes

In cooperation with several state and private agencies we are also breeding for disease resistance, high quality, and high yield in sweetpotatoes suitable for processing. Progress is slow and difficult. One variety, Sunnyside, from this program has attracted the attention of processors in the Eastern Shore area, but we look on it as only a stop-gap. We have many wilt-resistant, productive, orange-fleshed seedlings, one or two of which may be good enough to release, but it is difficult to find just the combination of disease resistance, productivity, market quality, and cooking quality desired.

Melons

The improvement of varieties by breeding is a continuing program. Sometimes the development of a new variety only temporarily solves a grower's problem in disease control, for production may be decreased again by a new insect, another disease, or a soil and water problem.

I think one of the best examples in this connection relates to melon production. Even though melons are not a canning crop I shall mention them briefly. We have been engaged in melon research in the Imperial Valley of California for many years. First, the industry was threatened with extinction by powdery mildew. Disease-resistant varieties that permitted resumption of melon production were produced. Then new races of mildew began to cause further trouble. Resistant varieties that made an expanded acreage possible were found. But the job is not done. Now crown blight, a trouble that seems complex, is causing dying of the vines beginning at the crown, and has again made it unprofitable for many growers to produce melons. We are currently turning our attention to the solution of that problem through research planned in cooperation with California and Arizona. It will take teamwork of pathologists, physiologists, soil scientists, and entomologists to determine the cause of crown blight and develop methods of control.

Fruits in General

The department's program for developing new fruit varieties by breeding has been confined largely to peaches, grapes, strawberries, blueberries, and other small fruits. We recognize, of course, that disease-resistant varieties of all fruits would be welcomed by growers, for controlling diseases by chemical means adds greatly to the cost of production. We have no extensive breeding program for apples, but we are cooperating with the Indiana Agricultural Experiment Station on the development of scab-resistant varieties. A number of the State Agricultural Experiment Stations, principally New York (Geneva), Minnesota, Iowa, Ohio, and Missouri, have developed and released new varieties of apples. We have a modest program on the development of blight-resistant pears. Most of the important apple and pear varieties used fresh or for processing, however, have been in cultivation for a great many years.

Our research on apples and pears has been in the direction of increasing yields and quality through improvement of production practices. These include soil management, fertilization, and other cultural practices; increasing size and quality by chemical thinning; the use of hormone-like chemicals to prevent preharvest drop; and the use of effective insecticides and fungicides for the control of insects and diseases. Improvements in practices of harvesting, transporting, and storing fruit have contributed to quality.

With stone fruits other than peaches, there has been no marked change in the variety picture. We are cooperating with the Washington Agricultural Experiment Station in a breeding program to develop new sweet cherries and apricots. Montmorency has long been and still is the leading sour cherry variety for processing.

Virus diseases are a major concern in orchards because of the long life of the individual plants. Considerable work is now in progress in a federal-state cooperative program on the many virus diseases of stone fruits, particularly peaches and cherries. This is basic to obtaining virus-free stocks and preventing spread of such diseases. Viruses are present also in grapes, blackberries, and raspberries. It is important that information on the cause and control of the diseases they cause be developed as rapidly as possible so that growing of these fruits will continue. A repository for virus-free stocks of stone fruits has been set up in an isolated area in the State of Washington. It is intended that this serve the various states and nurserymen throughout the country as a source of virus-free budwood. Our pathologists, in cooperation with insect specialists in the Entomology Research Branch, are determining the insect carriers of various viruses. Control of the vectors will help to prevent their spread.

Developing new varieties of fruit by breeding takes a long time, but the payoffs come eventually. New varieties of citrus are needed to extend the season with fruits of better quality. This need results partly from marked changes in the processing methods in recent years and the general recognition of the need for fruits of higher juice content and better flavor. Citrus rootstocks resistant to the numerous fungus and virus diseases are needed.

Peaches

The need for high-quality varieties of peaches better adapted to the regions where they can be grown has been recognized for many years. As a result of breeding programs of the USDA and state agricultural experiment stations, the variety picture is markedly different from what it was 20 years ago. Varieties now available for fresh use or processing have higher color, firmer flesh, and higher quality at harvest. Development of early- and late-ripening varieties with good qualities has greatly extended the harvest season. Our peach-breeding program is carried on at three locations: Beltsville, Md.; Ford Valley, Ga.; and Fresno, Calif. From this cooperative work on peach breeding, 26 varieties, 14 cling and 12 freestone, have been introduced. Processing quality is taken into consideration when evaluating varieties for introduction. It is estimated that about 40 percent of the canning peaches in new plantings in California are of the new varieties.

The cling varieties released to growers were all developed for California, while most of the freestone varieties were developed and tested in the more humid regions of the eastern United States. In general, freestone varieties are more widely adapted than the canning clings. The cling varieties developed for California conditions have not succeeded in the eastern United States, where the fruits are usually smaller and more subject to brown rot and bacterial spot.

However, promising cling seedlings selected from our crosses appeared in preliminary tests to be adapted to growing under eastern conditions. Fruits of some of these seedlings have been processed and appear to have satisfactory canning qualities. If the demand for canning clings were sufficient to warrant a sizable acreage for further processing trials, it is our opinion that cling varieties satisfactory for processing could be developed for the East.

An important problem encountered in peach production is the failure of young trees planted on old sites or where peaches have grown previously. In some cases, but not all, nematodes are responsible for the poor growth of trees. We are currently giving attention to this problem as well as to the production of nematode-resistant or nematode-tolerant peach stocks.

Strawberries

The improvement of strawberry varieties by breeding has been an important phase of our horticultural research since 1920. The first variety released in 1929, Blakemore, proved to be an important processing berry and is planted on about one-fourth of

the strawberry acreage in the United States. Breeding lines have been widely tested in cooperation with the strawberry-producing states. From this program 31 varieties have been released. The more recent introductions have combined the best horticultural characters of available parents, solid red flesh, firmness, and high quality. Three of these, Dixieland and Pocahontas for the East, and Siletz for the Northwest, are excellent for processing.

Varieties resistant to the red stele root disease, which is serious on many soils, have been developed. But our research is not finished, for a variety resistant to one race of the red stele fungus is not necessarily resistant to others that may arise or be introduced. For example the Temple variety introduced some years ago proved resistant to only one of three races now known. Our introductions of the future will contain resistance to all known races.

Research begun about 10 years ago to determine the cause of poor growth and lack of productiveness of strawberries revealed that much of our nursery stock of all varieties was infected with a virus complex. Fortunately some plants of most varieties were found by an indexing method to be free of the known viruses. These have been increased and distributed to nurserymen for propagation. As a result of the program for improvement of strawberry production, virus-free stocks of 29 eastern varieties are now obtainable through nurseries and virus-free plants of 10 other varieties are available for propagation. Experiments have shown that nurseries can maintain their stock virus-free. An additional research program has shown that the virus-free stocks can be freed of nematodes by hot-water treatment and can be propagated by nurseries so that stocks are approximately nematode-free as well as virus-free.

Nematodes, the Cause of Widespread Losses

For a long time nematodes have been known to affect plants, but in many cases these microscopic pests are not held responsible for the lack of vigor, poor response to fertilizers, and susceptibility to wilting that they actually cause. The poor growth of peaches caused by nematodes has already been mentioned. Recently, burrowing nematodes have been found to cause spreading decline, a disease threatening the citrus industry of Florida. Gradually we are learning more about the effects of nematodes that do not cause root knots and other readily recognized symptoms. Research is showing that nematodes affect crop production not only directly but also indirectly by increasing susceptibility to other soil-borne organisms or by introducing them.

Control of nematodes is difficult. A number of chemical fumigants applied to the soil before planting some crops give excellent control of nematodes. Breeding nematode-resistant varieties has been promising for lima beans, for example, and nematode-resistant rootstocks have been selected for peaches. Hot-water treatment to kill nematodes in strawberry roots has been developed, but control of nematodes within plants is difficult. We are searching for chemotherapeutic and other treatments that will kill nematodes in the plant tissue without injuring the plants.

Plant Introduction in Crop Improvement

The search for new or useful plants from abroad is one of the oldest phases of the work in our Horticultural Crops Research Branch. Some 260 thousand seeds and other plant materials have been brought to the United States since 1898, when the federal service of plant introduction was established. In recent years this work has been expanded, and it is now possible to bring in about three times as much plant material as before. We are now bringing in some 10,000 plant introductions a year, and about 1 in 250 of them is proving of value in breeding programs. This promising plant material, which constitutes an important source of germ plasm for use in crop improvement, is maintained at nine distribution centers where stocks are available to state, federal, and private breeders.

The lima bean collections brought into this country point up the importance of plant introduction in providing germ plasm to be used in our breeding and plant improvement programs. Resistance to downy mildew has been found in lima bean collections made in India, Guatemala, and Mexico. We have located disease resistances in tomatoes from Peru, cucumbers and melons from India, sweetpotatoes from Australia and the South Pacific, thrips resistance in onions from Iran, and so on. The Peruvian currant tomato (*Lycopersicon pimpinellifolium*) has probably contributed more important genes to new tomato varieties than any other tomato introduction. More and more we are finding it necessary to explore in the original habitats of our agricultural crops to find characters that are needed in crop improvement.

Chemical and Other Methods of Increasing Crop Yield

I have outlined in some detail the progress made in crop improvement and increased yield through development of resistant varieties with good horticultural characteristics. The part played by new chemicals in recent years in increasing yield through better disease and insect control has been spectacular. Research in private industry has produced a wide range of highly effective materials. Workers in public service have helped screen these chemicals for specific crops and diseases.

Research with growth regulators during the past 10 years has given us a much clearer picture of the absorption and movement of chemicals through plants. This is basic to an understanding of the possible practical use of chemicals for systemic control of diseases. We have tested a large number of compounds for growth-regulating activity. Some of these have increased yields in small-scale tests.

Growth chemicals are now widely used in this country to prevent drop of apples, pears, and citrus. They have also been found effective in increasing size of some fruits. Increased yields of vegetables and small fruits have been obtained indirectly by using many growth chemicals in high concentrations to control weeds that compete with the growing crops.

Antibiotics for Disease Control

One of the most encouraging research developments in plant disease control is in the use of antibiotics to control bacterial and fungus diseases. Also we now have evidence that antibiotics may have some effect on virus diseases.

Recent work shows that streptomycin controls bacterial diseases such as fire blight of apples and pears, bacterial spot of pepper, and seed-piece decay of potatoes. It is also effective against various fungus diseases such as late blight of tomatoes and downy mildew of cucumbers and lima beans. The first antibiotics tried in plant disease control were those prepared for medicinal purposes. Now, some prepared specifically for plant disease control are showing promise. If effective these would be more economical for agricultural use, since they would not require as high a degree of purification as those used in medicine and small dosages are possible.

Control of Soil-Borne Diseases by Biological Means

Development of resistant varieties has helped to avoid loss from certain soil-borne diseases such as verticillium and fusarium wilts of many vegetable plants. Other diseases, however, such as those caused by Sclerotium and Rhizoctonia have have not been solved by breeding; these fungi are able to attack a wide range of plants, and no resistance has been found in susceptible crop species or varieties. It has been observed frequently that fusarium-wilt organisms are destroyed by unidentified natural agents. Root rot of beans in Florida, for example, has been reduced by modifying cultural practices, such as turning under crop residues. We need more information on how microbiological processes affect the soil-borne diseases by favoring certain micro-forms of life and suppressing others. Some

of the soil-borne diseases may also be related to nematode attacks, and studies on the inter-relations of the nematode and other populations of soil and biological processes might give worthwhile control measures.

Conclusion

In conclusion I would like to emphasize the progress made in past years in improvement of varieties by breeding, in developing disease-resistant ones, and in screening new chemicals for control of diseases would not have been possible without the excellent cooperation of industry. We have depended upon you for assistance in field tests of promising varieties and in preliminary evaluation of their processing qualities. One of the marked trends of the times is the increase in the number of scientists employed by industrial firms for research on horticultural problems. New techniques that should help to speed up our research output are being developed. We are aware that more basic research will be required to solve some of the most pressing problems in the production of horticultural crops. Teamwork between various disciplines in public research institutions and industry should provide other new chemicals, antibiotics, or additional techniques that should result in further accomplishments for the benefit of agriculture.

Farm Equipment Research Program of the USDA

By E. G. McKibben,
Agricultural Research Service,
U. S. Department of Agriculture

This opportunity to take part in the national meeting of your Association is much appreciated. I am particularly pleased to have the privilege of discussing with you the farm machinery research program of the Agricultural Engineering Research Branch of the Agricultural Research Service of the U. S. Department of Agriculture. Our group at Beltsville also wishes to take this opportunity to express our appreciation of the excellent cooperation we have had from both officials and members of your Association.

It seems appropriate to open this talk with a brief discussion of the responsibility and proper function of public research agencies in the field of farm equipment research. Much of what I will say in this connection is taken directly or paraphrased from a "Tentative Statement Relative to Research in the Field of Farm Equipment" prepared by a Joint Committee[1] of state experiment directors and a representative of the U. S. Agricultural Research Service.

New and improved equipment on the American farm has become a most effective aid toward increasing farm efficiency, lowering the cost of production and handling of farm produce and taking the heavy physical labor and drudgery out of farming. Further advances and improvements, in equipment and mechanical methods on the farm, must be made continuously if agriculture is to keep the forward pace with industry. The parallel progress of agriculture and industry is essential to the advancement of the American economy and way of life.

Advances in design and development of farm equipment and mechanical methods are achieved through research and application of research findings. Research in America is conducted, controlled and financed for the most part, by two groups:

(1) Private individuals and corporations using their own funds and working in their own interests primarily. While they are mindful and appreciative of the public interest, their consideration thereof is properly related to their private or corporate interest.

(2) Public and quasi-public agencies using publicly appropriated funds and grants-in-aid from private sources, and working in the public interest. As applied to the field of farm equipment, this group of researchers properly serves the processors and handlers of farm produce as well as operating farmers and the farm equipment industry.

Although more research is needed on the problems of farm equipment and mechanical methods than both public agencies and private industry can do in the foreseeable future, there is no justification for use of publicly appropriated funds to finance research which can and will be done by private industry promptly, adequately and in anticipation of farmer's needs.

Stated positively the use of publicly appropriated funds for research in the field of farm equipment is justified on the basis of needs which are not being adequately met by the research of private individuals or corporations and needs which can be more effectively and economically met by public research agencies. There are many situations where there is definite need for the development of new or improved methods and equipment for field operations. Situations where the value of the new developments to farmers and society may well justify the cost of the required research but where, on the basis of private or corporate interest, research by private agencies is not justified.

For example, the need may be to mechanize the production of a critical and strategic crop on a "national-defense", "stand-by" basis, or in the case of many important but minor crops, the potential sales volume may be too small to be of interest to those larger companies which have the facilities to conduct adequate basic and development research. In other cases, the probable required research and development cost will be more than the pioneering company can recover because of the price competition of equally effective companies which did not have pioneering research and development costs. There is also the possibility that net returns from the sale of the new or improved equipment may be no more or even less than that from the machines replaced.

Further, basic research in the determination of fundamental principles and general requirements can frequently be conducted more effectively and at lower cost by public research agencies because of facilities, already available for other fields of research, such as land, laboratories, special research equipment, scientific instruments and terms of research technicians from many fields of science. In this connection, our branch accepts a definite responsiblity to cooperate with both biological and social scientists. It is not enough that sound engineering principles be used in the design, conduct and analysis of agricultural engineering research. If such research is to be useful, it must be based also on sound plant and animal science and on the principles of economics and if it is to be widely and effectively used it must be accepted by agronomists, horticulturists and economists. It should be emphasized that many of the advances made in the mechanization of field operations during recent years have been greatly influenced by developments resulting from research in the fields of soils, field crops and horticulture. As the easier problems of farm mechanization are solved, the developments in related fields of agricultural research will become of greater and greater importance to the successful solution of those more and more difficult problems of mechanization which remain.

We also believe that we have a responsibility to cooperate with farm groups and related organizations such as your Association as well as with the farm equipment industry. We need the guidance of the farm groups and many of our findings can be of greatest value to farmers and in the end to society only if accepted and used by equipment manufacturers.

In considering cooperation, certain facts should be kept in mind. First, cooperation presupposes essential equality between cooperators rather than the relation of superior and subordinate. This principle does not, however, necessarily require equal interest, contribution or benefits. It is

[1] Director L. E. Hawkins, Oklahoma Agr. Exp. Station, Chairman.

almost impossible to handle cooperation between two or more individuals or agencies in such a way as to insure equal benefits to all parties, although insofar as practicable such equality should be the goal. Probably, the real criteria for each cooperator should be: Are the benefits to be obtained by cooperation greater than those which would be obtained without cooperation? Insofar as our interests are concerned, we can give a very positive answer to this question in the instances of our cooperation with members of your Association. We trust that your members who have cooperated with us feel the same.

Thus farm equipment research in public agencies is supplementary to and not in competition with or a duplication of activities by private industry. In general, the primary objectives are to develop fundamental principles and basic requirements. Of course, in such research new or modified equipment will frequently be required. These needs are usually met by one of the following methods:

(1) Searching the field of currently manufactured and available machines and machine components for ones which can be adjusted or assembled and adjusted to perform the operation being investigated.

(2) Adapting or modifying existing tools and machines as prototypes for more effective performance or to meet new needs.

(3) Finally, where necessary, making and testing completely new prototype machines to determine principles and requirements. Such machines usually have wide range of adjustment. They are designed as research instruments and are by no means production models.

What research projects does our branch have which might be of interest to the canning industry?

Tillage: At the Tillage Machinery Research Laboratory at Auburn, Ala., in cooperation with the Soil and Water Conservation Research Branch and a number of state experiment stations, studies are under way to determine the effects of tillage, transport and traction equipment in producing soil compaction as well as other changes in the physical condition of different types of soil under different operating conditions. We also have research under way to develop improved and more effective equipment for soil and water conservation practices.

Rather than specific statements about best tillage practices, I wish to emphasize that present indications are that, first, there is no one best system of tillage and, second, that much of the power, labor, and cost now going into tillage operations is at best wasted.

Planting: While we have no engineering projects directly connected with the planting of canning crops, our research in cooperation with agronomists on the equipment problems of planting cotton are confirming basic principles and resulting in equipment developments which should be applicable to many of the crops in which you are interested. Seed should not be planted until soil temperature is high enough for the germination of the particular crop. At one station where we are cooperating, soil temperature data is a routine item of the weather report previous to and during the cotton planting season.

If rapid and uniform germination and emergence is to be obtained, seed must be placed in firm, moist soil, must be covered sufficiently to prevent drying out but not deep enough to interfere with emergence. Further, the surface contour should be such that the heaviest probable rain will not drown the seed or young plant or cover the seed so deeply that it will not emerge. Developing equipment to meet these requirements for different soil types and climatic conditions, even for one crop, such as cotton is no easy task. However, our workers cooperating with state experiment stations in the Mississippi Delta, the High Plains of Texas and Oklahoma, and the irrigated cotton area of the San Joaquin Valley of California are making real progress. Our engineer at Lubbock, Texas, has developed on attachment for lister-planters which is proving very effective in meeting the requirements of that location. This device has been made available to users by a local manufacturer who has sold over 15,000 of these attachments. The larger manufacturers have cooperated in some phases of this development and are incorporating certain of the principles in their planters.

In connection with planting, your industry has shown great interest in "precision planting." This seems to be usually thought of as precise placement along the direction of the row. Actually, real precision planting is a matter of three directions and includes accurately controlled depth of planting and minimum lateral variation from the center line of the row as well as precise spacing along the direction of the row. In cotton mechanization it is being found that accurate depth control and minimum scatter from the center line of the row are of greater importance than extreme precision of spacing along the row. Accurate depth control is essential to uniform emergence without which uniform plant spacing cannot be obtained irrespective of the accuracy of seed spacing.

Also for cotton, a straight narrow row of plants with a minimum of lateral scatter is of great aid in weed control and mechanical harvesting. Further, for cotton rather extensive data from carefully designed, conducted and analyzed experiments indicate that there is little difference in yield over a rather wide range of plant population per acre. This range was as wide as from 20,000 to 50,000 plants per acre for most areas and the varieties grown.

As with tillage there appears to be no universal answer for ideal equipment for planting even one crop for all soil types and climatic conditions. On the other hand, we believe that with sufficient study it will be possible to develop special equipment which will effectively handle the planting requirements for almost any seed under almost any set of conditions.

Fertilizer Application and Placement: Engineers of our project on fertilizer distribution and placement have cooperated with engineers, agronomists and horticulturists in a number of States, particularly Wash., Mich., N. Y. and Md. on the problem of determining the best fertilizer placement pattern for a number of canning crops. They have built several special research machines for experimental plot use, machines which meter fertilizer accurately and which have a wide range of adjustments for both fertilizer and seed placement. The studies with the Michigan station during the last three years have included, also, the problems of soil fungacide distribution and placement. This project has also developed special equipment shielded with transparent plastic for the precision application to experimental plots of fertilizer tagged with radioactive isotopes.

In cooperation with the North Carolina agricultural station workers, the hose pump which was developed several years ago by the Tennessee station has been recently modified and improved. This pump is now in commercial production and is proving to be very effective in the application of low-pressure liquid fertilizers. It has no valves or orifices to clog, no moving metal parts in contact with the liquid being pumped, a discharge rate proportional to speed and can be readily and economically built with any desired number of discharge tubes.

Weed Control Equipment: Engineers of the branch in cooperation with other branches of ARS and state experiment station workers are working on the improvement of equipment for the control of weeds with chemicals, flame and mechanical cultivation. There is not time to go into detail on the program, but again there appears to be no universally best system. As with tillage, planting, and fertilization, each farm and perhaps in some locations each field presents an individual problem from the standpoint of the best combination of equipment as well as of agronomic or horticultural practices.

Spraying and Dusting Equipment: We have had more cooperation with members of your Association in our research in this field than in any other. At Forest Grove, Ore., there has been a project in cooperation with the Entomology Research Branch and the

Northwest Canners Association on the control of pea aphids by aerial application. We had a project at College Park, Md., cooperating with the Maryland station and the Tri-State Packers Association on the development of a prototype high clearance self-propelled sprayer for sweet corn suitable for the rolling topography of that area.

Currently, Mr. Irons, who is in charge of the Insect Pest and Plant Disease Control Laboratory at Toledo, Ohio, and whom many of you know, is in Florida testing the effectiveness of an experimental low volume air blast sprayer in controlling tomato blight. These particular tests were undertaken as the result of suggestions made by one of the committees of your Association.

Another important project at the Toledo Laboratory is one dealing with the problem of obtaining uniform distribution among the nozzles of multiple nozzle dusters. The laboratory built and equipped a vacuum room which made possible the accurate determination of the discharge from each nozzle. This equipment was made available to manufacturers of dusters. Over a period of years a large number of dusters have been tested and many of them modified or even redesigned to greatly improve their pattern of distribution. This activity has, of course, had little direct publicity. We believe, however, that it has been of great value to the users of crop dusters by improving the effectiveness of such dusters and reducing the cost of pesticide dusts required.

Fruit Harvesting and Handling: Our engineers cooperating with the Michigan Agricultural Experiment Station and with producers and processors have developed a successful system of transporting tart cherries from the orchard to the plant in water. This system which results in improved quality and reduced costs is being extensively adopted. About 25,000,000 pounds were handled in this way during the past season.

The same workers have also demonstrated a plan for the use of 20 bushel boxes for peeler and cider apples which reduces the cost of orchard handling of these apples by 5 to 10 cents per bushel.

In closing, we invite your suggestions and constructive criticisms. As you have the opportunity we will be glad to have you visit us at Beltsville or at the laboratories at Auburn, Ala., or Toledo, Ohio, or visit workers who may be conducting investigations in cooperation with state research agencies located in area.

Soil and Water Conservation Research Aids Plant Production

By W. W. Pate,
Agricultural Research Service,
U. S. Department of Agriculture

It is a distinct pleasure for me to have this opportunity to discuss with you the research program of the Soil and Water Conservation Research Branch of the Agricultural Research Service. Dr. Wadleigh, Chief of the Branch, regrets that he is unable to be with you, due to prior commitment to attend the Soils, Water, and Fertilizer Research Advisory Committee, which is meeting in Riverside, California, this week. It is my purpose to give you a brief review of the scope and variety of work done in the Branch and, then, illustrate some of the work having a more direct interest to you. Most of you probably know that the Department of Agriculture is made up of several agencies grouped by functions with each group under an Assistant Secretary. In our case, Assistant Secretary Peterson is responsible for the Federal-States Relations group comprised of the Agricultural Research Service, Federal Extension Service, Forest Service, Soil Conservation Service, Farmer Cooperative Service, and Agricultural Conservation Program Service.

The Agricultural Research Service has two major subdivisions—research and regulatory. In research there are some 20 branches, again grouped according to program or function. The two functions which are probably of greatest interest to you are the Crops Research and Farm and Land Management Research. Our Branch is a part of the latter and so is Dr. McKibben's Agricultural Engineering Branch, while Dr. Cullinan's Horticultural Crops Research Branch is a part of Crops Research.

Now that we have pegged these activities in their appropriate places, we shall have a look at the scope of work done by the Soil and Water Conservation Research Branch. As indicated by Salter (A) in the Journal of Soil and Water Conservation, this Branch comprises the research in soils, fertilizers, and irrigation previously conducted in the former Bureau of Plant Industry, Soils, and Agricultural Engineering, plus most of the research transferred from the Soil Conservation Service in 1952 and 1953. All of the work out in the States is cooperative with State agricultural experiment stations. For program administration, the Branch is organized into five Sections.

Eastern Soil and Water Management Section

The Eastern Soil and Water Management Section, working in the 31 Eastern States and Puerto Rico, is under the leadership of Dr. L. B. Nelson. It seeks to develop improved practices for controlling soil erosion and water runoff, for more efficient irrigation and drainage, for improvement of physical condition of soils, and for improvement in soil fertility through use of fertilizers and other soil amendments. The team approach is used in which state and federal soil scientists, engineers, microbiologists, agronomists, and others contribute their skills to the solution of the problems. The work includes a wide variety of research such as mulch tillage to more efficiently use water resources and prevent erosion; improved terrace designs and intervals; strip cropping and rotations for better control of erosion; soil compaction studies aimed at overcoming production losses from "traffic pans"; supplemental irrigation research to find ways of using water more efficiently through proper combinations of water, fertility, and plant populations; and even the use of climatological data for predicting irrigation needs.

Western Soil and Water Management Section

The Western Soil and Water Management Section with Dr. O. J. Kelley, as Head, works in the 17 Western states and conducts research similar to that listed above for the Eastern Section, but with greater emphasis on the effective use of crop residues for moisture conservation and wind erosion control, efficient use and conveyance of irrigation water, and the field management of saline and alkali soils. This area includes some of the most extensive land use such as wheat farming on the Great Plains, as well as some of the most intensive farming in the country such as the vegetable production around Salinas, Calif. In the West, water has long been recognized as the major limiting factor in agriculture.

Watershed Hydrology Section

Another phase of our work deals with engineering features of soil and water conservation research. This work, carried out in the Watershed Hydrology Section under W. C. Ackermann, as Head, consists of three lines of study (1) hydrology of agricultural watersheds, (2) the hydraulics of conservation structures, and (3) sedimentation of streams and reservoirs. I think you may be interested in knowing a little more about these activities, because you, not only have a general interest in abundant water for agriculture, but you are also

Capital letters in parentheses refer to literature cited at end of paper.

interested in the quality and quantity of water yield from natural watersheds as this water affects the canning industry.

In the field of agricultural hydrology, studies are carried out to evaluate the effect of various land uses and management practices such as conservation farming on the yield and rate of runoff. Studies carried out cooperatively with state experiment stations and other agencies are now active in 16 states. The watersheds vary from just a few acres in some cases to as large as 70 square miles out in the Southwest where it sometimes takes a lot of land to produce a little water.

Most of the work conducted by the three Sections I have mentioned is done out in the States and much of the work is done in field plots with some greenhouse experiments and supporting laboratory studies.

Soil and Plant Relationships Section

The work of the Soil and Plant Relationships Section with Dr. Wadleigh, as Acting Head, is more concerned with basic research in the chemical, physical, and microbiological properties of soil and their effect on plant growth responses to soil amendments. The work is primarily of a laboratory and greenhouse nature at three major laboratories.

The U. S. Plant, Soil, and Nutrition Laboratory, at Ithaca, N. Y., with Dr. K. C. Beeson, as Director, conducts research on the effects of soil and geological conditions on composition of plants in relation to nutritional problems in animals and man. This Laboratory is constantly seeking to discover the causes of nutritional problems of animals and man which may have their origin in the deficiency or excess of elements in soils. An outstanding illustration of this kind of problem is the association of human goiter with iodine-deficient crops grown on soils of low iodine content. Those soils are now largely delineated and occur in the interior of the country.

The U. S. Salinity Laboratory, at Riverside, Calif., under direction of Dr. H. E. Hayward carries on basic laboratory investigations, supplemented by field experiments, on saline and alkali soils, reclamation practices, quality of irrigation and drainage waters, and the salt tolerance and water requirements of crops. Much of the research done by the Salinity Laboratory finds immediate application in the Nation's soil conservation program. For example, the diagnosis and improvement of saline and alkali soils depends upon accurate measuring methods to determine their properties. Recent improvements have been made in a soil solution extractor and an electrical conductivity bridge for measuring the salinity of soil and irrigation water. The new equipment combines portability, low cost and sufficient accuracy for diagnostic purposes. A more widespread appraisal of saline soils should help farmers to avoid crop failures. In the slides which will be shown presently you will observe other contributions this Laboratory makes to the solving of soil and plant production problems.

The Soil Research Laboratory, at Beltsville, Md., is the third unit of the Soil and Plant Relationships Section. Its research includes basic studies on procedures and methods (a) for evaluating soil properties and reactions between soils-fertilizer nutrients and plant growth; (b) for investigating the molecular structure of compounds in soils, plants and fertilizers; (c) for studies of the physiological and anatomical principles affecting absorption of nutrient elements by plants and the ability of the plant to accumulate, utilize, or modify soil constituents. Some of our most fundamental research is conducted at this Laboratory. Radioactive isotopes are an important tool, and some of the work is supported by Atomic Energy Commission funds. We shall see some illustrations of this technique in the slides.

Fertilizer and Agriculture Lime Section

The fifth organizational unit is the Fertilizer and Agricultural Lime Section with K. D. Jacob, as Head. It conducts research on the preparation, technology, and use of fertilizers, liming materials, and other soil amendments. When new formulae for fertilizers are developed, the Section frequently produces, in its laboratories at Beltsville, sufficient quantities for field experiments in cooperation with State agricultural experiment stations. This Section also gathers, analyses, and publishes statistics on resources, supplies, production, consumption, and trade relations of all types of fertilizers with the objective of increasing their efficiency and lowering their cost to farmers.

Examples of Research Accomplishments

With the foregoing outline of organization and scope of activities as a background, let me show you a few slides illustrating some of our work that may be directly, or indirectly, useful to you.

Since water is of universal interest, we shall present a glimpse of the watershed hydrology activity first. The first slide (1) is a view across an experimental watershed near Waco, Texas. Here, a field of young cotton is growing on a watershed which is contoured and terraced. This method of farming is compared with other watersheds growing a similar crop but farmed in straight rows. The next view, (2) downstream from the first picture, shows the gaging station where the rate and quantity of runoff is automatically measured in a flume. Here, also, the flow of water is sampled for sediment content, which is a measure of erosion. Here, (3) is a small two-acre watershed near East Lansing, Mich. Streamflow, rainfall, temperature, soil moisture, and other measurements are recorded automatically in the white shelter in the center of the picture.

This next view (4) shows a test channel at the outdoor laboratory at Stillwater, Okla., where the hydraulic properties and maximum permissible water velocities are determined for grasses and crops used in waterways and diversion terraces. In another laboratory at Minneapolis, hydraulic structures like this one (5) —a straight drop spillway and stilling basin—were developed for the safe disposal of water.

Finally, (6) the Watershed Hydrology Section is concerned with rates and control of sedimentation. This involves the process of erosion, sediment transport, and sediment deposition. This view is an example of extreme gully erosion and is the production site of sediment which not only damages the land, but lowers water quality and fills downstream ponds and reservoirs thus destroying their usefulness. Here, (7) we see Big Sand Creek in Mississippi where some of the upstream material has dropped in the stream channel and where more sediment is being produced from an eroding bank.

All of this engineering research on hydrology, hydraulics, and sedimentation draws upon data obtained in small-scale studies by agronomists and other scientists who develop and test, in laboratories and on small plots, the improved practices for managing the land. These developed practices are then applied on watersheds and streams to integrate the effects on natural landscapes. This, then, gives to the Soil Conservation Service and other using agencies answers which are real and quantitative.

Not only are we concerned about quantity of water, but also with quality. Many people do not know that there is such a problem as salinity of waters for irrigation. Others know of it, but think it is confined to the western United States. A few are beginning to be impressed with the serious injury caused by saline waters used for supplemental irrigation in the more humid parts of the country. The problem has been recognized (8) in New Jersey, Delaware, Virginia, Florida, and other locations. The potential use of brackish waters for irrigation of high-value truck crops along the eastern seaboard should be of special interest to canners and processors of vegetables and other crops. M. H. Gallatin of the Eastern Soil and Water Management Section has studies underway in cooperation

with the Virginia Truck Experiment Station at Norfolk, Va., to determine the effects on plants and soils of using water of varying salt content applied in different methods, amounts, and frequencies.

This slide (8) shows a layout of plots with corrugated sheet metal dividers. In the next view (9) water is being applied with a single overhead spray rig. This rig is bottle-fed, the bottle containing water of a desired salt content. This next slide (10) shows, on the left, beans irrigated by sprinkler with water containing 500 p.p.m. of salt and, on the right, beans surface irrigated with 4,000 p.p.m. of salt. Next slide (11) has 500, on left and 2,000, on right—both sprinkler. Next (12)—surface irrigated with 4,000 p.p.m., on left, and 1,000, on right. Next (13)—sprinkler irrigated with 2,000 p.p.m. of salt, on left, and 1,000, on right. This picture (14) shows a new experiment in cooperation with New Jersey Experiment Station to study different crop sequences over a period of years under irrigation. The picture was taken at beginning of the experiment before effects of treatments showed up. This (15) shows a plot set up at Tifton, Ga., for tobacco irrigation in cooperation with the Field Crops Research Branch and the Georgia station.

In these days of increasing water shortages, every effort should be made to conserve this valuable resource. Farm ponds are becoming a more important asset on the average farm. Seepage losses from these may be serious. This next slide (16) shows an experimental lining in a pond at Coshocton, Ohio. This is one of the locations where an effort is being made to evaluate plastic materials of different thicknesses, with and without a sawdust subgrade, and with and without a soil covering.

Irrigation in the East is becoming of such economic importance that there has developed a great need for interpretation of climatic data (17) as a guide to how often drought may occur and how much water may be needed. Dr. van Bavel (C), in cooperation with the North Carolina Experiment Station, is making studies of the "drought days" to be expected, how much water can be stored in different soils, how fast water is lost by evaporation and transpiration and how much is needed to replace that lost from the soil. A report of these climatology studies will appear soon as a North Carolina Experiment Station bulletin. The slide you are now looking at is a sample of the kind of data it will include. It shows the minimum number of drought days to be expected in the period April through September in 2 out of 10 years for different parts of the State where there is a 2-inch storage capacity for soil water. For example, in the middle part of the state there would be 50 drought days. Similar graphs will show the same data for soils of different storage capacities.

Learning how to correct or to live with some of the problems of poor water quality is part of the studies conducted at the Salinity Laboratory by Dr. Leon Bernstein (D). The next slide (18) shows a field of beans in the Imperial Valley of California in which salinity has caused a spotty stand. Other row crops such as vegetables, sugar beets, and cotton are affected in like manner. In this view (19) we see an experiment designed to correlate germination with initial soil salinity at planting time. Each plot was treated with water containing different concentrations of salt. After planting, the plots were irrigated with ordinary canal water. The next slide (20) shows differences in seed germination on the different treatments. In the next 3 views we see a closeup of the effects of different amounts of salt. This view (21) has no salt and good germination. This one (22) has 2,000 p.p.m. and considerable injury, and finally, this one (23) with 12,000 p.p.m. is almost a failure, except for rows on the side of the bed. These results led to further studies on bed shape. An analysis of salt concentrations from various parts of a sedbed revealed this kind of salt distribution pattern (24). You will note a concentration of salt at the top or center of the bed. This view (25) is a cross section of experimental beds. This view (26) shows good germination on check plots, while this view (27) shows germination on various shaped beds when the soils contained 20,000 p.p.m. of salt—about the level of soils flooded with seawater. You can see the sloping bed had a decidedly beneficial effect. To explain what happens on these various shaped beds, let's have a look at these next four or five views and follow the progress of the wetting front which tends to carry the salts along with it. (28), (29), (30), (31), and (32). This view (33) shows how the wetting front passes by the seedling on the sloping bed and takes the salt on beyond thus allowing the seed to germinate and the young seedling to get beyond the very sensitive stage where injury is most likely to occur.

Plant Nutrition Problems

Work conducted in the Western Soil and Water Management Section by Viets et al (E) in the Columbia Basin revealed that zinc deficiency was seriously limiting production of some crops. These studies showed that beans, corn, grapes, flax, and castorbeans were very sensitive to zinc deficiency in soils, while potatoes, tomatoes, onions, and alfalfa were mildly sensitive. Some crops such as small grains, asparagus, mustard, and carrots were not sensitive. Here (34) is zinc-deficient corn and (35) here is a closeup view showing zinc deficiency in Red Mexican beans. Here (36) is a field of Red Mexican beans in which the center row has been treated with zinc sulphate spray. You can see the fresh green color of the treated row in contrast to the untreated plants. Here (37) we can compare a normal corn leaf, at bottom; a zinc-deficient leaf, in center; and an iron-deficient leaf, at top. This view (38) shows effect of zinc deficiency on onions. As a result of these studies, it was found that fertilization with zinc sulphate at the rate of 23 pounds zinc per acre decreased the severity of symptoms or prevented them entirely. Recent studies show that zinc uptake by plants is not proportional to amount of applied zinc. Particularly on weakly buffered soils, zinc uptake appears to be affected by the source of nitrogen. Sources leaving residual acidity in the soil such as ammonium sulphate greatly increase zinc uptake. Last year one company, alone, sold 1,400 tons of a zinc-containing smelter byproduct for use in correcting zinc deficiency in the Columbia Basin area.

The problem of zinc deficiency has been recognized on certain soils leveled for irrigation in North Dakota. It has also been observed in Nebraska and California. The indications are that the problem is increasing as we raise the level of production, especially by use of fertilizers that contain less extraneous materials than formerly.

For another illustration of techniques used to study nutritional problems in plants, we take you to our Beltsville Soils Research Laboratory where John C. Brown and colleagues (F) have been working on causes of chlorosis in plants grown on calcareous soils and methods of correcting it. For many years, it has been known that certain plants are susceptible to "iron chlorosis" and several workers have corrected iron-deficiency-chlorosis by using chelates containing iron. However, Brown has found, through use of isotopic tracer techniques, certain chelates which actually contain no iron were effective in making sufficient soil iron available to the plants to correct the problem on some soils. Autoradiographs were used to demonstrate the absorption of the iron.

This view (39) is an illustration of the autoradiograph technique. In this case, the light color in the leaf and roots is due to radiation emanating from C^{14} isotope in the chelate compound. You can readily see that the chelate, or some of its decomposition products, is absorbed by the plant. To prove chelate DTPA makes soil iron available, tagged iron was added to the soil before applying the chelate.

This view (40) shows how thoroughly the iron was made available and distributed in leaves.

The following views show some of the problems being worked on and results accomplished:

First, (41) and (42) show iron chlorosis in peach trees. Here, (43) we see chlorosis corrected by chelate DPTA and, here, (44) some differences in susceptibility to chlorosis of different varieties within the same species of soybeans (Hawkeye, center —PI 54619-5-1, on sides).

Chelate APCA is more effective than chelate DTPA in correcting chlorosis in plants grown on Millville soil, as we see here (45), (46).

Nutritional Relationship of Climates, Soils, Plants, and Animals

In supplying food to our expanding population we must think not only of high yields, but also of nutritionally richer crops. The Plant, Soil, and Nutrition Laboratory, in cooperation with State experiment stations, has been studying (47) the causes for differences in nutritional value of crops grown in different climates on different soils and with different management practices. Important progress has been made. For instance, it has been found that test animals grow differently when fed diets including seemingly identical turnip greens from soils in two locations in Georgia. Louise Gray and coworkers (G) found that rats make much better gains on turnip greens from Blairsville, Ga., than on turnip greens from Experiment, Ga. Through a series of animal assays involving both chickens and rats, it was determined that Vitamin B_{12}, or a substance much like Vitamin B_{12}, was present in the greens from Blairsville but was not present, or was present in too small quantities to be effective, in those from Experiment.

The slide at which you are now looking shows graphically the growth rates of rats when fed diets containing the turnip greens grown at the two locations and when fed the stock diet used to maintain the rat colony at the Laboratory. Assays of the greens, made by using two different species of microorganisms, showed the Blairsville greens contained about 14 times as much Vitamin B_{12} as those from Experiment, Ga.

Another example (48) of nutritional problems was the revelation in cooperative studies at the New Hampshire station that calves fed heavily fertilized timothy hay developed a goiter-like enlargement of the thyroid and failed to gain normally until hay from other sources was substituted. Here, we see a stunted calf that was fed on the heavily fertilized hay and calf that was fed normally. Thacker (G) of the Laboratory staff participating in these studies thinks phosphorus in the timothy planting may be a factor and doubts that current tests will show any relation to iodine content. G. Matrone, formerly with the Laboratory, now on the North Carolina staff, found that low-phosphorus soils produced nutritionally inferior legumes. Rabbits fed such hay developed weak bones (49). A phosphorus supplement solved the problem, especially when supplied through soil and crop.

If time permitted, it would be possible to continue a large number of illustrations of soil management research affecting crop yield and quality such as these (50) showing mulch tillage for moisture conservation and erosion control which was taken May 13. One month later, (51) June 14, there was a good stand of corn which was being cultivated (52) in this picture taken June 30.

However, the samples shown will give you some idea of the kinds of research done in soil and water conservation and how it may be of concern to those interested in the production of crops and the processing of food of high nutritional quality.

To assure you that there are unsolved problems, we shown you here (53) what is commonly called "monkey face" in lambs. It is a problem found in certain grazing areas in the West. Dr. K. C. Beeson (H) of the Plant, Soil, and Nutrition Laboratory is cooperating with the Utah station and other agencies in studying possible relationship of geologic origin of soils to the nutritional quality of vegetation produced on it.

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Officers Elected by Other Associations

Officers of other trade associations elected at their annual meetings during the Convention period are:

Canning Machinery and Supplies Association

President—C. K. Wilson, Food Machinery and Chemical Corp., San Jose, Calif.; vice president—John C. Swift, White Cap Company, Chicago; secretary-treasurer—W. D. Lewis, Washington, D. C. (reelected); ex officio—E. N. Funkhouser, Dewey & Almy Chemical Co., Cambridge, Mass.

The Forty Niners

President—David S. Nay, Wm. J. Stange Co., Chicago; vice president—Frank S. Langsenkamp, F. H. Langsenkamp Company, Indianapolis; secretary-treasurer—Ed Judge, *The Canning Trade*, Baltimore.

National Food Brokers Association

National chairman—Walter H. Burns, Sr., Walter H. Burns Co., Inc., Pittsburgh; first vice chairman—George E. Dillworth, Kierce & Dillworth, Inc., Detroit; second vice chairman—W. Sloan McCrea, Earl V. Wilson & Company, Miami; third vice chairman—Arthur G. Curren, Jr., Arthur G. Curren Company, Boston; member-at-large—Roy W. Madden, R. W. Madden Company, Atlanta; treasurer—Harry E. Cook, The Harry B. Cook Company, Baltimore (reelected); president—Watson Rogers, Washington, D. C. (reelected).

Old Guard Society

President—Harry A. Miller, Burt Machine Co., Baltimore; first vice president—H. J. Barnes, Kaysville Canning Corp., Kaysville, Utah; second vice president—Sidney B. Cutright, Illinois Canning Co., Hoopeston, Ill.; secretary-treasurer—John Dingee, Can Manufacturers Institute, New York (reelected).

Young Guard Society

President—J. Ed Raley, Jr., Raley Brothers, Inc., Atlanta; first vice president—Ned Tempas, Green Giant Company, Beaver Dam, Wis.; second vice president—George H. Horsley, The Horsley Co., Ogden, Utah; secretary-treasurer—Herb Shek, H. S. Crocker Co., Inc.; Baltimore.

Association of Canners State and Regional Secretaries

President—John W. Rue, Tri-State Packers Association, Easton, Md.; vice president—Warren R. Spangle, Indiana Canners Association, Indianapolis; secretary-treasurer—Jack R. Grey, Pennsylvania Canners Association, York.

FISHERY PRODUCTS CONFERENCE

PRESIDING: Guy V. Graham, Chairman, Fishery Products Committee, N.C.A.; Libby, McNeill & Libby, Seattle

How To Move More Canned Fish

. . . to the Family Table

ADDRESS by Richard Hooker, Head Grocery Buyer, Philadelphia Branch, Food Fair Stores, Inc., Philadelphia

ADDRESS by W. H. Crawford, Crawford's Modern Village Stores, Inc., El Monte, Calif.

. . . to the Restaurant Table

ADDRESS by Margaret L. Mitchell, Vice President, Food Production, Stouffer's Restaurants, Cleveland

ADDRESS by John Ruffley, Assistant Director of Research, National Restaurant Association, Chicago

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How to Move More Canned Fish to the Consumer's Table

By Richard Hooker,
Food Fair Stores, Inc.

I am pleased at the opportunity to take part in this panel discussion today on how to sell more canned fish. Although a casual reader of the regular weekly food ads in many cities might be excused for thinking that selling canned foods is a minor activity of today's supermarket judging from the space devoted to dinnerware, pots and pans, soft goods, nylons, encyclopedias, housewares, and —oh yes—trading stamp plans—, we're still in the grocery business. And the grocery departments still account for almost half of the supermarkets' total sales volume.

You and we have one great purpose in common; you want to move more canned fish to the consumer's table and we want to see that canned fish bought in our stores. I hope that in the discussion which follows we can agree on some ways and means to do this.

Preparing for this session I checked over our canned seafood sales figures for the past three years. Reviewing our movement figures confirmed many of my preliminary thoughts concerning this problem.

It seems to me that, elementary as it sounds, before we can sell more canned fish in several important varieties, we retailers must get more to put on sale. As far as we're concerned, supply has been far below effective demand on salmon, sardines and shrimp. Effects of tight supply on price are obvious.

Take salmon as a first example. Last year a pack of approximately 17 percent of the previous year's on Puget Sound makes pretty academic the question of how to sell more. We can't tell you how to move more if we can't get enough, even at today's out-of-line prices.

Maine sardines are another item in which a tight supply has raised prices way out of line with competition. The 1955 pack was less than half of 1954's. As a result, costs and retails were appreciably higher. We find that at any retail over 3/25¢, movement is noticeably retarded. We're happy to report that our movement of California sardines is now showing an improvement, reflecting, we think, the improvement in the quality of product being canned since domestic sardines came back on the scene.

In the case of shrimp, we have another example of the effects of price on movement at retail. 1953 was a high cost, high price year; late 1954 to mid 1955 costs and retails were down 25 percent from mid 1953, and our sales at retail doubled. Currently it looks like costs are back at 1953 levels. As soon as our retails begin to reflect the higher costs, we expect that volume will drop significantly.

When we do get an item in plentiful supply—and therefore also fairly priced, there's much we can do to sell it by the carload. Tuna is the best evidence of that.

At Food Fair, our tuna sales last year came to over 2 percent of the total pack. Since our overall chain sales volume of $410 million was about 1 percent of the nation's total retail food sales, it would appear that we're doing a job on tuna. I think we are. And here's how:

Basically, we have been aggressively promoting tuna at every opportunity, and making as many opportunities as possible:

Our stores have made good use of striking displays—gimmicks like fish nets and boats made part of the display—a whole tuna frozen in a block of ice and similar traffic-stoppers.

Related item displays—tuna and noodles, tuna and rice, etc., have been successful too.

We have also tied in with canner's promotions and have created our own when necessary.

We have featured tuna in our ads consistently. The availability of cooperative advertising funds on nationally advertised brands has made it possible to feature tuna more heavily than any other fish item. This cooperative activity has been important in keeping tuna tonnage in our stores at peak levels.

Of great importance, we have had stocks 52 weeks of the year. No "outs" to cut volume.

All our brands of tuna are up in tonnage, but our private label has been up more than the rest. And the reason for this is that we have insisted on handling the same top quality of the same species at all times. By care in selecting our sources of supply we can guarantee our customers the same uniform high quality of product in every one of the 52 weeks of the year that we stock it. Here, too, we make sure that it's never out of stock. Sure, retail prices on our private labels are slightly under national brands, and that helps to explain the higher tonnage, but I'm convinced that consistent quality has been just as important.

To sum up, consistent, imaginative and aggressive promotion, consistent quality control, competitive pricing and 52 week stocks are the four essentials for selling more canned fish,—in fact, for selling more of almost anything.

We at Food Fair are well underway on some mighty ambitious expansion

plans. Having just recently passed an annual sales rate of $500 million a year, we are planning to add $100 million in new volume annually each of the next five years, to achieve a one billion dollar volume level. Opening 40 to 50 new stores each year, we're confident of reaching that goal. Personally, I would like to see our canned fish sales rise proportionately to that doubling of chain volume.

To keep pace with our plans and with the increased sales expected by the retail food industry generally, you canners of fish have a challenge of no small proportions.

I have tried to cover a few of the points. However, we're sure we don't have all the answers. We're ready and willing to discuss all angles of this problem at any time. Let's make a start this afternoon in the open discussion period that follows these talks.

Food retailers are ready to work with you in keeping canned fish in the first division of our league. How about it?

How to Move More Canned Fish to the Restaurant Table

By Margaret L. Mitchell,
Stouffer's Restaurants

The purpose of my presence here on this panel is to represent the restaurant industry, and to express my views on how to increase the usage of canned fish products in restaurants—or perhaps answer the question why more canned fish products are not used in restaurant service.

In preparing my thoughts for this panel discussion, I started by asking myself the question, "Why doesn't Stouffer's use more canned fish products?" And the only answer I could come up with was, "No particular reason. We just don't think of them often enough as we make menus and plan food production." This answer might well be the reply in other restaurants, too. Now maybe that's a poor excuse, and if you fish canners think so, then I believe you'll have to take part of the blame, because you should be reminding us about your products frequently.

Merchandising Program

The first suggestion I have on this subject of how to increase your products' usage in restaurants, is that your Association review your merchandising program.

What are you doing to remind the restaurant operator about your product, and what are you doing to create consumer demand for your product? You have a quality product—why not merchandise it more?

We live in a changing world today. Changes are going on about us all the time. Nothing remains constant, and least of all business, so it becomes the duty of every progressive organization to keep up with the times, to bring changes into their routine, and to bring out new products, then to tell their customers about them. Merchandising and advertising seem to be a "way of life" in this country. We're all addicts to it, whether we think so or not. As individual citizens we are constantly being influenced by advertising and promotional material. The food business is no exception. If you disagree, just open up any current magazine, and look at the ads—beautiful color displays that stimulate your interest in many different kinds of foods and influence your eating habits, as well.

I could not find any canned fish ads in the magazines I checked, however.

As a restaurant person I can say that in our company we are influenced in our menu-making by the food ads. On our staff each member has the responsibility of checking magazines and newspapers for new food ideas. Attractive ads are considered important enough to clip for our Idea Scrap Book, just as a housewife might do it at home.

We find, too, that popularity of dishes in restaurants is affected by newspaper or magazine ads. People look at the pictures at home and are drawn to the selections of these same items on a menu in a restaurant.

This is a good way of creating consumer demand for a product.

Another way to merchandise your product with the restaurant operator is to give him new ideas for food service.

Emphasis on Institutional Service

Develop an active Consumer Service Department for Institutional Service. In this department new recipes for your product would be developed and new food ideas created. A system would have to be established whereby these new ideas are quickly taken to the consumer. They should be put into the hands of the restaurant operator, and promoted in some way, so that a consumer demand will be created.

Perhaps the new ideas could be promoted in the form of booklets, or bulletins, or news letters, or recipe cards. Whatever the media, the material should be short, but have real stimulation. Good color pictures can add a great deal, and be extremely effective.

I brought along a few samples of booklets and material which have come to my desk recently. Perhaps you've all seen it, but you can see how influential such material is to the restaurant menu-maker. These booklets are often followed by letters with up-to-date ideas for further uses of the products.

In my opinion there need not be quantities of literature sent out. No one has time to read a lot, but a few "quality" pieces with colored pictures can do a real selling job.

With your products you have tremendous possibilities, because your products are so versatile on a menu. You can make appetizers with them, or main entree dishes, salads, sandwiches, snacks of all kinds or dishes such as—creamed tuna in a fluffy baked Idaho potato, served with tossed vegetable salad—and you have a wonderful luncheon dish.

Tuna cheese grill with pineapple ring.

Tuna fish cakes with hollandaise sauce.

Salmon souffle served with creamed new potatoes and peas. This could be a beautiful picture—made in a ring mold, and creamed vegetables in the center.

Boneless sardines on toast—grilled and served with Welsh Rarebit Sauce.

Crab flakes Dewey, served in a sizzling ramekin.

New and different uses for anchovies.

Your products have many potentials for different services. Information from the Consumer Service Department does not have to flow weekly or monthly—quarterly or semi-annually is frequent enough, providing it has a good "promotional punch" when it arrives.

Restaurant operators are always looking for new ideas for their menus, and if you don't stimulate them to use your products, the cheese company, or the meat companies, or the poultry man will be there ahead, selling their wares, and giving their ideas to the menu-maker.

National Salmon Week is coming up from February 15 to the 22d. What concentrated promotion is ready for this? To date this is what has come to my desk, and the menu desk at Stouffer's. Is this enough?

Meetings of Institutional Buyers

Another way to bring your product before the eye of the restaurant operator is to participate in the National Restaurant Association meeting or in the local state association conferences. I'm not drumming up business for the sale of booths for the National Restaurant Association, but I only say that these conferences are well attended, and you are as good a judge as I am on how influential displays at their meetings can be.

This is a quick way of getting your product, and your educational material, before a concentrated group of potential users.

This holds true not only of National Restaurant Association meetings, but there are other fine institutional meetings, such as the National Home Economics Association, and the American Dietetic Association meetings held annually, too. These are well attended by dietitians who are in charge of hospitals and various feeding institutions, and they are excellent potential users of your products.

Educating Your Public

Another suggestion is to review your educational program.

Are you telling the public about the high quality of your product? Are you telling them about the rigid inspection of your plants?

I am very much impressed with the exacting care your industry has in bringing a top quality product to your users. I think this story would be both interesting and educational, if told in some form to the public.

Perhaps an educational film would be worth while. Keep it reasonably short and definitely educational, and then promote it and arrange showings to all kinds of groups. I always remember a tuna film I saw once that I thought was outstanding. If this film is still in existence I think it might be brought around again. It surely would stimulate tuna fish sales.

Visual education is a big part of any promotional program today, and it should not be overlooked by your Association.

Another very successful way to further your educational program is to develop on your staff a company spokesman, one who can tell the story of your industry in an interesting fashion—perhaps show your film, and have some well-chosen ideas to offer to a group about fish cookery. This person could be a popular program participant on national conventions, provided, of course, the material would be presented from the educational point of view—not the product promotion theme.

There is still another way which comes to my mind, and that is for your association to take part in the annual meeting of Newspaper and Magazine Food Editors. This is a very influential group with the public, and I understand their annual conference is quite an affair. The newspaper articles following the convention tell a lot of food stories. Yours might very well be among them.

I believe I've said enough about a merchandising program and an educational program, but I repeat that as I see it restaurant operators are influenced by promotion and advertising, and your sales force and consumer research department should keep us reminded of your products. Other food products companies are at our door, either through booklets, letters, educational material, or in person, with good ideas for the use of their products. That's your competition.

Container Sizes for the Institutional Markets

The only other suggestion I have is that after you have stimulated sales with the restaurant operators, pack your products in sizes that suit their needs.

Labor is costly to every restaurant operator. Don't ask him to open 7-ounce sardine cans for service of a hundred or more people. Pack quality sardines in oil in large sized cans.

Pack quality tuna in oil in 4-pound cans.

Pack quality skinned and boneless salmon in large size tins—perhaps 4-pound cans.

Pack anchovy fillets in larger sized cans.

Work with the restaurant operator on his problem, and from these contacts develop your own program of what you can do to assist him in the use and service of your product.

Canned fish products are popularly accepted foods in this country. They are fairly popular on restaurant menus now, and could be more popular if a concentrated merchandising and educational program were developed to create consumer demand, and to stimulate the restaurant operator to serving it in new and different ways more regularly.

Restaurant operators, I feel sure, will cooperate and respond to such a program.

How to Move More Canned Fish to the Restaurant Table

By John Ruffley,
National Restaurant Association

It is a pleasure to discuss with you certain facts concerning the great restaurant and institutional market. I am sure that you all know that in order to move more canned fish to the restaurant table it is necessary to "know your market." For this reason I have been asked to discuss with you the growth of the restaurant industry, its extent and related facts indicating what sort of a market it is. I am pleased to comply with this request and will discuss points of interest to you.

"Know your market." If you do, you will, I am sure, try to do three things which will make it possible for you to sell your products in that market. First, you will produce for that market the most acceptable form of the product. Second, you will make it convenient for that product to be used. Third, you will educate your jobbers and distributors, as well as the people purchasing for that market, in the proper and greater use of your product. This approach will help you to meet the needs of the restaurant and institutional market and in so doing, make it possible for you to gain your objectives.

Our first field of discussion, then, should be concerned with facts about the restaurant industry, the nation's fourth largest business. The business of eating has always been and still is the principal occupation of mankind. Even in the United States, the most industrialized country in the world, more of the national income goes for the purchase and consumption of food than for any other category of production or services. I am speaking here, of course, of food consumed both in the home and *outside* the home. It was estimated that for 1955 Americans would spend almost $75 billion for food and beverages, or, putting it another way, 30 cents of each dollar spent by the American consumer would be spent for food and beverages. Of course, the greater part of food and beverages are still consumed in the home, but 25 percent are consumed *outside* the home. This has been a development of recent years. I am sure that many people in this audience will remember, as I do, that 30 years ago many industrial and other workers carried their lunch in the old-fashioned dinner bucket. Their meals at work were prepared in the home and taken to work in the dinner pail, and perhaps there was a picnic on Sunday where a basket lunch was carried. What have been the changes in recent years? First of all, many, many industrial workers today eat their lunches in the factory cafeteria. This has grown to be an important segment of the public feeding industry. With the increasing use and number of automobiles America has almost literally taken to wheels and, of course, as people travel, perhaps spend all day Sunday riding around in their car, they must stop on occasion to eat. Diner drive-ins and similar establishments have sprung up in recent years and this too has grown to be an important segment of the restaurant and public feeding industry. College students away from home eat their meals in the college dining hall, but even our youngsters in high school and junior high school may purchase a lunch there in many schools. And during the war years, of course, a great many young men ate meals away from home. There has been, then, a pronounced and growing trend toward "eating out."

In fact, so large a part of the food dollar is now spent on meals prepared and served outside the home that the food service industry ranks fourth in size among all the industries of the nation—well ahead of such giants as the petroleum industry and the public utilities, and actually surpassing in

dollar volume the total amount spent on new and used cars. It was estimated that in 1955 the public feeding industry was a $17 billion market. This means that this amount of money was spent by Americans for meals, including meals with beverages, consumed outside the home. These figures are derived and based on government statistics and for purposes of definition we define a restaurant in its broadest sense as meaning any establishment where food is consumed away from home for a consideration.

Other figures abstracted from a recent statistical study in which you might be interested are as follows:

An average of 78,000,000 meals are served each day in the nation's restaurants. The total number of all food service establishments in the country is 540,000. There is one restaurant for every 700 persons in the United States. About 55,000 of the nation's leading restaurants do nearly 80 percent of the total industry volume. The number and wide variety of food service establishments place facilities for "eating away from home" within the reach and pocketbook of all individuals. It is anticipated that as population and other businesses in the country increase in the years to come, the food service industry will do likewise. But instead of making predictions, let us now proceed to a discussion of the necessary points which we mentioned in the beginning.

What is the most acceptable form of the product, in this case, let us say, canned salmon or canned tuna fish, to the restaurant man? Quite obviously the acceptability to him will be determined in part by his customer response, and in another part to his own response, that is, its adaptability to the conditions in which he finds himself. First of all, let us consider the product we are discussing. A food such as canned salmon, is already in a very acceptable form. It is (a) precooked, (b) keeps easily, (c) attractive in appearance, and (d) highly palatable. What could be done to improve this? First of all, it might be marketed in more varied forms. When I, for example, think of canned tuna or canned salmon, I think of the two plain items, but I am not familiar with variations of these basic forms. Isn't it possible that the greater use of canned salmon and tuna could be encouraged if a wider variety of products incorporating these items, such as precooked casserole dishes, tuna and noodles (which, I understand is already being marketed), canapés, spreads, and more table-ready dishes were available? These suggestions are based on the fact that the table-ready foods are finding greater acceptance by restaurant and food service operators because of increased labor costs in their kitchens, and because they incorporate portion control and ease of inventory. The "tuna and noodles" dinner which I have just mentioned would seem to be a step in this direction. New items, such as canapé or sandwich spreads, would seem to be quite helpful in encouraging more widespread use of fishery products such as salmon and tuna.

The size of the container is important to the restaurant man. The small retail size is not always convenient for him to use, although there are occasions when it is. At the other extreme, the large institutional size of canned food is not always looked upon as a great "boon" because it may not all be used. You must remember there are a great variety of types of restaurant and food service operations. The restaurant man is probably tending to an increased use of intermediate sizes of containers. This came as rather a surprise to me. We do know that many restaurant men object to what they think is inferior quality in, let us say, a No. 10 can of a canned food item. Here in this room we all know of the necessity for thermal processing and how it can cause quality variations of the same product when packed in containers of greatly varying size. In any event, there seems to be a trend away from the use of No. 10 cans by some people. However, when a good quality item is available, it is definitely a convenience to the restaurant man, and if that same good quality is available in various size containers, he will tend to choose the size container most suited for his needs.

Let us next explore the convenience of the product. Certainly if in the storeroom of a restaurant, hotel, or hospital kitchen, there is an ample supply of canned fish, it will keep very well and it is there to be used when needed; then as such, it is a very fine thing. However, when the kitchen help receives instructions to use this canned fish, they are up against two problems which I would like to discuss with you and which, incidentally, we are working on to some small extent. First of all, can opener equipment is not always adequate. Often restaurant people complain that there is not a good can opener available. We have been checking into this problem for a year or two. In many instances the can opener is either worn out and, therefore, not completely satisfactory or, perhaps, is not adequate for other reasons. One comment is that equipment which will open the cans easily and effectively causes slivers of metal to fall into the food. We have recently received information that there are now available several openers which appear to be more satisfactory. But there is certainly room for great improvement in this item of such a great importance to the canning trade. A related problem to this is the disposal of the empty cans. I recently had dinner with a very fine restaurant operator who uses large amounts of canned food. His trash and disposal man visits him on Friday and not again until Tuesday. Over the week end he has to take a storage room and fill it with the empty cans and cases. It's quite obvious that a simple can crusher, easily operated and sufficiently low in cost to be practical, is indicated. We have tried to check into this and among the replies to my inquiries so far is a very fine letter from the president of a canning equipment company, describing a can crusher costing $1,800. Quite obviously this item is too costly for the average restaurant operator. Your people, trade organizations, and technical departments of can companies, have been very cooperative in the past and I believe that somewhere we are going to get suggestions that will help with these two small problems that I have mentioned. But I cover them to indicate the type of work which I believe will make it possible for the restaurant man to feel happy about using canned foods. Keep in mind the kind of equipment that the restaurant man must use and, if possible, try to streamline your products, including the containers, to his uses.

Another thing that we can do to encourage the restaurant man to use more canned fish is, of course, education. If he is given interesting money-making ideas for the use of a product, he will certainly feel encouraged to try out and possibly use more of that item. How about an example of this? A quite popular item back home in Massachusetts, where I originated, is a lobster roll. In this, lobster meat is placed in a hard, oval bun. This is something like a sandwich. One of our former neighbors used canned tuna instead, and this made quite a wonderful item. Just think how effective this would be for drive-ins. With people stopping on Sundays and holidays to purchase hot dogs, perhaps a delicious fish roll could be made to be equally popular. This, of course, is related to the standard recommendation of putting recipes on each label of a can, or by putting recipe sheets in with each case furnished to the restaurant man.

While we are on education, the restaurant man must not forget the general public. While we are educating the general public's taste for canned fish products, through cooperative advertising we could perhaps be able to make the use of fish an everyday menu item instead of once a week. What points will we use in that? I am sure that your fine promotional men will tell you to stress (a) nutrition, (b) economy, (c) variety, and (d) related advantages. If steps such as these are taken and if through cooperative advertising the restaurant operator's customer is encouraged to ask for and order a specific product, then both the

restaurant operator and the packer of the food benefits through greater consumer acceptance. In this regard, I might mention that the restaurant market is an "influential market." Friends in the trade have told me that food items which gain consumer acceptance in the restaurant soon find additional acceptance in supermarkets and other food stores.

In summary, I have tried to point out a few interesting facts concerning the restaurant and public feeding market to you and to show how a consideration of the problems of the restaurant and food service operator are related to his acceptance of the product. If you "know your market," that is, your restaurant market, you will then try to:

(1) Furnish the restaurant man with the most acceptable form of the product.

(2) Make it convenient for him to use.

(3) Educate the restaurant man and the public in the greater use of the product.

MARKETING SESSION

PRESIDING: Howard L. Stier, Director, Division of Statistics, N.C.A.

PANEL DISCUSSION: "The Canner-Retailer Partnership"

MODERATOR: Marie Kiefer, Secretary-Manager, National Association of Retail Grocers

SPEAKERS: W. H. Crawford, Crawford's Modern Village Stores, Inc., El Monte, Calif.; W. T. Dahl, Dahl's Food Markets, Des Moines, Iowa, and G. Vander Hooning, Can's, Inc., Holland, Mich.

ADDRESS: "The Future of the Packers' Label in Canned Foods Marketing"—A. J. Becker, Vice President and Food Products Supervisor, Foote, Cone and Belding, New York

ADDRESS: "The Possibility of Establishing Your Own Label—from the Food Broker's Viewpoint"—Harry L. Proctor, Paul Paver & Associates, Inc., Chicago; and Chairman, Canned Foods Committee, N.F.B.A.

The Canner-Retailer Partnership

Moderator: Marie Kiefer
Secretary-Manager of N.A.R.G.U.S.

Mrs. Kiefer: We have three very fine panel members here. These gentlemen and their six stores represent approximately $18 million worth of grocery business.

By W. H. Crawford
Crawford's Modern Village Stores

Mr. Crawford: One of the things our customers demand of us is quality. They like their canned foods nicely labeled. They like attractive labels. This we know by the way they pick the cans up off the shelves and displays. They want the label to represent pretty well what is inside the can. If they get hold of a fancy label and the product inside is mediocre, well, heaven help you the next time that label appears on a product of yours. I might cite an illustration which is somewhat to the point.

I have a customer who will not buy any of a nationally known brand —simply because she found a bee in one of the cans she bought. Since then that brand is off her list.

I want to comment a little about what we as retailers like about you but I am also going to tell you some of the things we don't like about you. One of the reasons we like you is because 48.6 percent of our food business —I will say case goods received in our store—is canned goods. That represents 48.36 percent of the cost of all the case goods we receive. One fifth, or 20 percent of the total sales of our store are canned goods. I note that this is a little higher than the national average which I understand is about one-sixth. Perhaps the reason in our particular store that this average is a little higher because we have in our big store a large nonfoods department, and we have taken practically all the nonfood items out of the grocery department, or the food side, in order to squeeze in a few more items that canners introduce from time to time.

Another reason we like canners is, of course, because the cost of handling and receiving dry groceries in our store is 2.45 percent of sales and we pay the highest wage scale of any markets in the United States. And I like that as long as my competitor has to pay the same high standard of wages because people with big pay checks are good customers in our stores.

The cutting, and opening, and marking cases of canned foods cost us 40 percent less than it does to open and cut the cases of package goods like cereals, etc. For canned foods it also costs us 15 percent less to stock the shelves, open the cases, and mark them than it does to put flat merchandise on the shelf.

I would like to comment a little on how we sell more canned foods. We find it profitable to promote Dollar Days or so many cans for a dollar, or so many cans for a certain price —anything that will raise the individual sale. We recently put on a promotion that we had never done before and we hadn't heard of in our community. We put on a sale of buffet size cans—8 for $1.00—assorted can goods in buffet size. Our men thought they would sell about 140 cases, and this was just one end display on the end of a gondola. The original order was 140 cases and we had to order an additional 85. So out of one end gondola on a three-day sale we sold 225 cases. This gives you an idea of what can be done with just a little effort. Buffet cans in our neighborhood are not particularly fast movers because we have a neighborhood where there are large families but we do have a lot of pensioners, a lot of people that we more or less overlooked, and they just walked off with basketsful of that merchandise.

As for what I don't like about selling canned foods, it's true we make more money on canned foods because our cost of handling is lower and we like the canned foods business but we think we can see how to improve or cut our costs even more if canners would do a few things. I am going to ask for the moon and see how much I get.

Our system was developed several years ago and we haven't done much to improve it recently. The merchandise comes in on a roller conveyor off the truck. One of our men then opens the case. He cuts the case round the middle, opens it up like a book, shoots it down the conveyor, and the next

man marks it with a well-known marking system. Then it goes down and is stacked in stacks 5 or 5½ feet high. The next man takes out the cans and puts them on the shelf, handling the two halves of the cases, on a little 2-wheel truck. We find this is faster because he can pick up the entire six or eight half-cases right on the floor with this 2-wheel truck. It's not such a hurdle as a 4-wheel cart in the aisle. We do all our stocking in the daytime because we have to pay premium rates for evening work. One of our problems is that a lot of canners will put 4 tiers in a case; that means we have to handle 24 cans individually to mark them. If we asked a canner to do that in his plant he would throw his hands up. Here is another fact I don't think you probably realize: we pay perhaps from one and a half to twice the wages for our help as canners have to pay. Four men will handle about 1,800 cases in a day, arriving on a semi-trailer, and in these 1,800 cases there will probably be a thousand items. How would you like to run that mess through a conveyor system or try to get real production on that? Recently I had a discussion with a man who said, "We are worried about the cost." Well, the housewife is not interested where the cost is cut, whether it is at the farm, or the packer level, or the retail level. I am sure that packing this merchandise the way we want it and providing a place on the can for us to mark it legibly for the housewife and the checker would reduce cost tremendously in our business. The next time you go with your wife to the store notice the checker and see how many times she asks the girl at the next check stand or rings for somebody to come and tell her the price of different items. Those delays are very expensive. To give you an idea of how expensive, I will cite an example. On a Sunday our checkers draw $32.00 for 7 hours and 15 minutes work, so we have to think about it.

This is what we are going to ask for. We want the merchandise packed in the case with the heads together. In other words, when we open that case in the middle, like a book, we would like that the top of each can to be on top, and then we want a clearer space in the middle without your code marks so that we can print legibly on there. You will notice this can in my hand is very shiny. It is very difficult to see the price on a shiny can top under the bright lights that we have in markets these days. We want a lacquered spot on the can that will stand hot water as they are put through the cooking process and which will eliminate that shininess and give us a good surface on which to mark the cans.

By W. T. Dahl
Dahl's Food Markets

I am glad to be here because you and I are in this food distribution business together. Your problems are my problems and my problems are yours. So naturally this panel today will point out what problems are yours. I hope someday you have the opportunity to point out to us retailers what we should do to cooperate with you.

We are not here to pat you on the back. I hope, incidentally, once in awhile off-handedly, we might do that. We operate in Des Moines, Iowa. We have two supermarkets. One has 22,000 square feet, the other one, 17,500 square feet. We have ample parking area.

We have parking area in the ratio of almost four to one in both stores.

Now I will try to point out to you that canned goods in our operations are important. In a survey we have just finished we tried to determine the position of canned goods in our stores. The footage represents approximately 25 percent of the total footage in the grocery department. The non-foods department occupies about the same amount of footage as our canned goods department does. We have made long dissertations in speaking around the country about how profitable our non-foods department is. We have talked about our gross profit picture and we give credit to our store engineer for making room for a non-foods department because our gross is therefore 3 percent or 4 percent above what it would be without it, and when that so-called recession comes that's just around the corner, we will be prepared to weather the storm. However, I have come to this realization from the figures I have dug up.

The canned goods department and the non-foods take up the same amount of space. The canned foods department gives us a gross of about 16½ percent of total sales. Our non-foods department gives us a gross of 32½ percent. So I could very easily say, "See, how fine it is to have a non-foods department." But the only way our auditors will let us operate today is to compute our gross margin after we have presented it for sale. So we have a total cost of stocking in our grocery department of which canned goods is a part of 1½ percent. If it were possible to make a time study I would think probably canned goods would be on the lower side of the average. So I can say to you that canned goods cost less than 1½ percent for us to receive, mark, and stock. Now let's take our non-foods department. How much does it cost us to receive, stock, mark and sell non-foods? We come up with something between 5 percent and 5½ percent.

We have also come up with this: that canned goods sell in twice the volume of non-foods. So I can make this statement. In our operations we should be very careful that these 40 percenters don't bankrupt us. That is about the last good thing I can say about canned foods. However, the survey of canned goods which we made was not complete—it was a survey of canned vegetables only. We hope to survey other canned foods as time goes on, these are some of the items we found.

We found that approximately 50 percent of the items in our canned vegetables department sold in quantities of one case or more per week, with an average of over three cases. I could have talked instead about the 50 percent that doesn't sell in these quantities, but I don't believe that is your fault; it's my fault. I saw a survey not too long ago that took the pessimistic attitude. It stated that out of 19 brands of pears two brands sold 81 percent, etc. Who should stock 19 brands of pears? So, any survey has to start with the operator himself. After all, many of these things are the fault of the grocer.

You might be interested to know that the turnover in our grocery department last year was 41 times. Without your cooperation this would not have been possible. However, with your further cooperation, I am sure it could be improved. We have to talk about the 50 percent of the items that sell less than one case a week. Whenever you put out a pack which is uneconomical for us to stock—and why I say uneconomical is because if only half the case will go on the shelf, the other half has to go back to the warehouse to be brought out again—you are not helping to control our present distribution cost of 1½ percent. However, a survey of turnover should not be taken with only the thought of throwing out items. For instance, when we took this survey, we came up with a certain number of items in the category of less than 10 cans per week. Naturally those items get very little consideration in our stores. However, some of them are kept, even though the shelf space was cut down. We keep such items because some people may trade with us and, after all, how much is a customer worth? I know it is worth the cost of stocking a few slow-moving items.

You have heard that I do not believe in advertising. But I believe in you canners advertising.

By Gerritt Vander Hooning
Van's, Inc.

In today's supermarket operation, retailers do not have the really personal touch which used to be prevalent in the small service store operation. We must, therefore, project our personality into the regular store features, in our advertising, and in just about every activity in the store.

This means that we must have some new, different and unusual promotional feature just about every day or at least every week. These features must be planned weeks in advance, and that means checking with the canner or manufacturer on his plans or special features, on the store promotion or tie-up material, and then developing our own supplementary cards and banners to get across the store "personality," and our own advertising copy to create a desire or an interest on the part of the public.

Briefly, here are some of the featured promotions we have had during the past year which proved worth while for our customers, for our suppliers and for us.

Last summer we had a special Swift's canned meat sale to tie in with their Disneyland arrangements. The store was really "dressed up" with every piece of promotional material we could get from the supplier, a lot of special signs of our own, and a real "Davy Crockett" who gave the children balloons, suckers, etc. We sold 750 cases of canned meat, and that's a lot of canned meat for one market, as I am sure you agree.

Late in August we ran a special promotion on the H. J. Heinz Company line. You see, Heinz has a large plant in Holland, Mich., employing a number of people and contributing a great deal to the economy of our community. At that season the pickle pack was at its peak and Heinz had just awarded thousands of dollars in prizes to winners in a contest on "Cooking with Catsup." We featured pickles and catsup in our advertisement saluting the H. J. Heinz Company and their employees for their contribution to the city of Holland. It looked to me like pickles and catsup had legs actually walking out of our store.

Very soon after that feature we got into the Campbell Soup Company promotion. Schools were opening and the theme of Campbell's consumer advertising was the quick school lunch. In our own advertising we used their theme and built up the quality theme —only the best goes into Campbell's— and used every piece of store tie-up material available including over-the-wire banners, talking cards, window posters, etc. Our sales of Campbell Soups that week were just a little more than double an average week.

You probably know that California Packing Corporation stages two big promotions a year—their Spring Garden Sale and their Del Monte Fall Round-Up. We always tie in with these features and for the Del Monte Round-Up this year we bought from Grand Rapids Wholesale, our supplier, a total of 1,265 cases of Del Monte canned foods, for this promotion. We actually have customers who wait for these special promotions on Del Monte products, and since I have sold Del Monte canned foods ever since opening my first store in 1922, you can realize that it isn't difficult for me to become enthusiastic about this feature.

During the last two weeks of October we staged a Shurfine sale. This is a house brand of our retailer-owned cooperative, but is becoming known as one of the "famous brands" in our area. This promotion, too, is backed up with continuous newspaper, radio and television support.

Hawaiian Pineapple Company usually features a big Dole promotion in the fall and this year we did a different type of advertising job. We sent for glossy print photographs of production scenes from the Islands and had our own plates made. If you think people don't read advertising— and I wonder many times if they read the price ads—they surely saw this one, because we had more comments on the informative material and illustrations showing how pineapple is produced, than we ever had on any other type of copy. Of course, we had in-store material, end displays, window posters, etc., and believe me our sales of Dole products went "sky-high."

Large national canners and manufacturers spend tremendous sums of money on consumer advertising, but somewhere along the line this advertising needs to be "merchandised" at the retail level. Stores need more colorful point-of-sale material—especially that which illustrates the end use of the product like the baked ham with all the accompanying prepared vegetables,—the colorful salad with the necessary dressing,—the prepared, ready-to-serve vegetable dish,—and the ideas that will aid customers in serving more appetizing meals. I am very envious of the beautiful color advertising used in consumer magazines, and while my newspaper cannot reproduce color like that used in the American Can Company ads, we could use the black and white prints. We do know they are effective and would like to be cashing in on this type of consumer advertising.

We would like to reproduce and take advantage of the color food pages of leading national magazines such as *McCall's, Better Homes and Gardens, Ladies' Home Journal.* Even though we would show them in black and white, we feel we would be getting the benefits of this type of merchandise for we know every woman reads and studies these menu suggestions.

You must realize that in today's self-service supermarkets all the retailer can do is expose your labels and your products to customers—and it's your advertising and ours that can influence the housewife to buy a specific commodity and a specific brand! There are many factors, in addition to the mention of price, which will sell a commodity to a customer—and one of the best ways is to show her how it looks on the table and how well it will please her family.

We like canned foods promotions at Van's because we know canned foods are still the "backbone" of a successful retail food store operation. We can change the entire appearance of the store, can create the "something's going on" atmosphere with your in-store material and ours, can tell the story of the product, its quality, its uses, best methods of preparation and serving, and that creates the "impulse" to buy. We're not looking for so much of the old-fashioned "carnival style" approach these days as we are the informative, well-illustrated materials that show the customer how she can use the product and the way in which it will please her family and keep them well-fed and happy!

Discussion

Mrs. Kiefer: Now I think we might start out our question-and-answer period by getting this philosophy of why I do and why I don't advertise spelled out a little bit, and Mr. Dahl, would you mind telling us why you don't feel it necessary to do the job of advertising that Mr. Hooning does?

Mr. Dahl: I believe, ladies and gentlemen, that it is merely a philosophy. If you listened closely to Mr. Hooning, you noticed that he said price ads were not effective but he was using them to some extent. Our philosophy is this. If you operate correctly so that the customer leaves your store completely happy, it is not necessary to spend money to bring her back. I think when anybody advertises like Mr. Hooning or Mr. Dahl they know very well they have slipshod operations; they are chasing their customers away and are admitting they have to spend money to get them back.

Mrs. Kiefer: Mr. Crawford, will you tell us why you use this kind of advertising?

Mr. Crawford: Well, of course, we have to get them in the door the first time and having a store of 62,000 feet of floor space we must maintain a high volume because we have about 325 employees in the store.

I will admit that once in a while we have to get some of them back but it's getting them in the first time that we are most interested in. As a matter of fact, there is a little system that we

use. We give a little prize to our employees who make a point to let us know there is a new customer in the store and bring her to what we call our customer-service counter. At that point she is given a fresh apple pie and a little material, a couple of postcards, pictures of our store, and we find if we could get them all in the store, if we didn't have such a new and dynamic growing community we could do like Dahl too, but we have 200,000 people a year moving into Los Angeles County so we have to advertise. Mr. Dahl has more of a stationary proposition, so he doesn't have to.

Mrs. Kiefer: Okay, let's give Mr. Hooning a chance to answer the question, too, please.

Mr. Hooning: This is funny because Mr. Dahl and I have been in a research group for many years and everytime he gets up he tells about a zero on his statement for advertising. Of course we spend one percent for advertising and Mr. Dahl doesn't spend any money, and he brags about it. Until about a year ago I found the solution. Here this fellow does below cost selling and he sells butter and coffee five cents a pound below cost and that's how get gets them into the store. But don't let him tell you that he isn't advertising because he is and he is in his eleventh week of a TV promotion that is costing him one thousand bucks a week right now and he is very happy about it. So he is advertising and don't let him kid you.

Mrs. Kiefer: Mr. Dahl, will you tell the audience how you decide to add a new item?

Mr. Dahl: Naturally, new items are a bugaboo to anyone. First, we have a basic philosophy on items.

For instance, if someone came in with a new catsup, we feel that Heinz catsup is nationally advertised and has very good acceptance. So that is the No. 1 item we carry in catsup. Now why handle another catsup? The only reason we should handle another catsup is if there is a price differential sufficient to warrant the handling. We don't believe that if we have the top advertised brand of high quality that it is necessary to carry another top advertised brand. But suppose someone presents a new item to us. First of all, we look at the packer. Is he a reliable packer? That in our way is determining quality. I remembered 20 years ago I was much more of an expert than I am today. I recall one time I sampled a complete line of canned goods, first tasting the peaches, then pears and beans, etc. At that time I was smart enough to tell which one was high quality and which was medium, and I imagine you gentlemen spend a lot of money for a taster, for someone to test your quality. And here I am in the retail business and have other jobs to do. I don't even pretend that I know anything about quality. It doesn't make any difference whether I happen to like it or not because I depend upon the packer. So if it is a reputable packer, then we should answer that yes and they will determine the quality.

Then we will try to determine whether or not it will merely add to our total sales volume or just spread the same amount of sales we have over just another item. And thirdly, and probably this is the most important, if we can answer the first two in the affirmative, we find out the promotion behind that item. Because we do no advertising we expect the company to promote them. We don't only care about couponing today or advertising today, we want to know how over a 6-month or 1-year period are they going to promote and create a demand. In our stores if there is not a demand for a product, we will not create it.

Mrs. Kiefer: Mr. Hooning, I believe you want to say something.

Mr. Hooning: I have to get in on the act because I think it is Mrs. Consumer who decides for us whether or not we are going to put in a product. Our house will take on an item that has any merit to it and we will try it out for a time. Now there are times when these things play out. I was on a program with the president of Lever Bros. about a year ago and I said to him, "If you had Rinso and Lux on your shelf—and these are nationally advertised items aren't they?—and you only sold a case in six weeks, what would you do?"

"Well," he said, "I would throw them out."

I said, "We did."

About three weeks later he couponed the City of Holland so bad we had to put Rinso and Lux back in again. The point I am trying to make is that the consumer is going to decide whether you put these items in or not, and this is especially true of known brands. If it is a double x brand or a label like I showed you there, sure, it wouldn't mean a thing, unless someone had specifically asked for it and we wouldn't put it in for one customer. But I mean for a known brand, the consumer decides in our area whether we put it in or not.

Mrs. Kiefer: The next question is: Tell us something about your store traffic. How many people do you have coming through the store to create the volume you have in your establishment? Have you any ideas? Can you give us any figures, any daily traffic count or anything of that nature?

Mr. Crawford: Well, we have a count on a weekly basis. In our store to create the volume we have we must have about 65,000 to 75,000 people a week through the store.

Mrs. Kiefer: Seventy-five thousand people a week. Okay. Mr. Dahl, do you have yours all figured out?

Mr. Dahl: We have presently 31,000 people through our store each week and the average sale is between $4 and $4.25.

Mr. Hooning: I wouldn't dare to give our customer count because I don't know, but our average sale runs somewhere between six and seven and a half dollars per customer.

Mrs. Kiefer: Your average sale would be higher and your customer count much higher in the summer months than it would in the winter months anyhow, wouldn't it, because you are a resort town?

Mr. Hooning: Yes, we are a resort town.

Mrs. Kiefer: One chain recently reported only a 2 percent increase in sales on a product with the use of end displays and they concluded the best selling spot in the store was on the regular shelf.

Mr. Hooning, do you agree with that one?

Mr. Hooning: This end display thing came up recently for quite a bit of consideration and has been talked about for the last 6 or 10 months and many surveys have been made. Recently I saw some figures about a national chain which had made a survey on canned milk in which they reduced the space and put it on the end display of that particular gondola and gave equal amount to 2 national brands and their own private brand. They ran this survey for 3 weeks, I believe it was, and they had the figures for the 3 previous weeks of record sales, and they came up with the astonishing figure that the national brands outsold their own private brands badly and they had only sold 8 cans more in the 3 weeks of the survey than over the 3 weeks of the regular sale. So they decided they would never put canned milk on an end display again.

Another retailer put an end display on the end of the gondola where the product was displayed in its regular place. They had tested this end display for 2 weeks, then they put 2 end displays, one in this very spot and one on the other end of the gondola. At the end of the survey they found out that their sales had only increased 1½ percent while they had the end displays. Now, to increase your sales 1½ percent by having end displays and all the labor that it involved in order to build up these end displays is not very profitable. So at this convention last week there was quite a bit of talk about "Do end displays pay off?" Some say they do, some say they don't. One of the larger operators on the West Coast made this statement: That in their new stores there would be no end displays because the labor conditions cost too much to put it up and that as far as sales were concerned they felt that they weren't getting any increase on that particular product anyway. So it is still con-

troversial. Probably a year from now we will have the answer.

Mrs. Kiefer: One of the large operators in the Middle West made the statement last night that in his new store he would have no provisions for end displays. Isn't that correct, Mr. Dahl?

Mr. Dahl: That is correct.

Mrs. Kiefer: Aren't you the guy that said it?

Mr. Dahl: We have 18 end displays in our present store. I couldn't estimate the cost of keeping those up. However, in the last two years we have made 11 or 12 of them permanent displays, partially to cut down labor and partially because we do not believe in them.

A year and a half ago I heard an ex-representative of one of the largest chains make an extensive presentation that a display will not help the sales of the whole department. In other words, what I am trying to say is that when we put up a canned vegetable display, sure, we will sell more of that particular product this week, but for a longer period our sales will be no larger because of it. So, as Marie has stated, the new store we have going in will have no mass display of any kind. We like to think that the customer as she enters that door is our customer. She trades with us because she wants to. She is skeptical, anyway, of displays because the retailers over the years have misused displays. I know of merchants yet today who put nothing on display which doesn't bring him a markup of 25 percent or more. We display only demand items and you probably know that demand items get down to 18 to 20 percent below cost up to 5 or 6 percent above. I believe that is frank merchandising. In other words, if you have the consumer in mind, you make it easier for her to shop.

Brought out at a recent meeting were the reasons why people advertise. Why they have stamps and such things and another is because we all agree we want to serve the customer, so they say she wants stamps and why not give her stamps. But aren't there other things she wants? There are probably other things she wants more that won't cost us as much money. This is the theory we are working on. In other words, we believe she wants more courtesy; we believe she wants more cleanliness; we believe she wants better-operated stores throughout; we believe in a better parking lot, an attendant at a parking lot, if you wish, better marked parking spaces, everything to do with a very well-run store. I don't believe that anyone can say what the consumer wants most, but let's agree that she wants stamps and that she also wants cleanliness and all these other things. It is up to the operator to decide whether he wants to give her stamps and nothing else or whether he can give her three, four, five or six of these other items and forego the stamps. I'm a believer.

Mr. Hooning: Are you putting in stamps?

Mr. Dahl: I'm not!

Member from Floor: Mr. Crawford says he wants to mark the top of the can. How does he mark the can now?

Mr. Crawford: We don't. We mark half of them on top and half of them on the bottom because we cannot afford to handle these cans separately.

Same Member from Floor (repeated by Mrs. Kiefer): Would it hurt the end display if half the cans were facing up and half facing down?

Mr. Crawford: I don't think we have any way of knowing that. However, that is the condition you will find in my store and most of the stores that are using this particular method of marking we are using.

If you will recall I said we were asking for the moon. Now if you will give us a bottom or a top, or both, without any code marks on it, a place where we can mark our merchandise we will be satisfied with that. But we are sure a housewife would like to pick up a can and look at the price and know that is what she is going to be charged. The only way we can do that is to have a clean spot in order to mark it. But if she picks the can up and has to turn it upside down, it is not good. It happens also at the check stand. The girl is going to have to turn it over. It is just a matter of efficiency. I would like to see the food industry and your industry get together on that. I don't care who pays the bill. I would be willing, as a director of N.A.R.G.U.S. to pay the bill. Let's find out the right way to do it and then make a recommendation.

Member from Floor (repeated by Mrs. Kiefer): Mr. Dahl what have you told the small canner about how to merchandise his product?

Mr. Dahl: I talked about H. J. Heinz and their tremendous advertising and I can talk about others. However there is an exception, and it doesn't have to be canners. We probably shouldn't refer to it as a nationally advertised full demand item. We should probably refer to it as second brand. In our particular area, we have a line of spices that over the years the small manufacturer or packer or whatever you call spicemen, has accomplished a lot of local advertising and a lot of local acceptance.

So I would think you as a small packer could concentrate your weight on an area and therefore have the consumers demand your product in preference to even those who buy the beautiful newspaper ads like Van showed you. I think probably that would be my answer to you.

(Same member raises question of carrying only national brands that are very well known over a lesser known brand.)

Mr. Dahl: If you came in and had a promotion behind your product which was a continued promotion that we felt would create a demand, we would be forced to buy your product, sir.

Mrs. Kiefer: Mr. Crawford wants to comment on the question, please.

Mr. Crawford: I happen to know a little about this product, of Mr. Noroian, the canner asking the question.

You have a very fine product and that is what I would say of products of any small canner. I will cite a little illustration. We went in to the stamp plan, but we formed our own company and put out the Crawford stamp that no one ever heard of in our community, right up against S & H with $40 to $50 million in the bank. But with our promotion which you saw some of here, in our own little neighborhood, we have the most popular stamp today in our neighborhood. Now to do that nationally would be suicide and I think that would be true of you. I am sure that a few stores like ours getting behind your product as being an especially good product, and I don't get any advertising allowance from him either, I don't even handle it yet, but if you would concentrate in one neighborhood, you could be the most popular canned peach canner in the neighborhood.

Mr. Hooning: Most of you people know John Porter. I haven't seen him in the audience, maybe he isn't here this year. John has been a very good friend of mine over the years but we still sell his product and sell lots of it today. It is the East Jordan Brand, he has a very high class product. I think it was way back, probably in the twenties when I was in the service store that he came into the City of Grand Rapids with a better product; it was a real good product that he had, and we started to sell it and we are still selling it today. Don't think for one minute that because we feature all these national brands that we don't sell a small canners product. If he has a product that is really good we will sell it in the area. We sell some New Era products. They have a couple of products that are outstanding. We sell them today. So we do sell small canner products although we might give you the impression that we sell only national brands.

Mrs. Kiefer: What are the average labor costs for each panel member? We will start with Mr. Crawford. The average labor cost percentagewise.

Mr. Crawford: It cost us about $2.45 for receiving and stocking in the grocery store, that particular department.

Mr. Hooning: What does he mean, over-all costs?

Mrs. Kiefer: He says receiving and stocking.

Mr. Crawford: May I add about 2 percent for checking, boxing and supervisory help at the front end or check stand area.

Mrs. Kiefer: That's 4½?

All right, Mr. Dahl, do you have have your figures handy?

Mr. Dahl: Yes. For receiving, stocking and marking, 1½ percent. Now we have a 3 percent checkout cost which we must charge against canned goods. Your guess is as good as mine whether canned goods check out faster than some of the other products or not. We have a 2½ percent management cost, so we come up with an 8 percent cost to get a can of goods out to the customer's car.

Mrs. Kiefer: Mr. Hooning, what about your labor costs?

Mr. Hooning: Our over-all labor cost is 5.6 percent and we employ a maximum number of part-time labor. I know the labor costs of these boys because we just had them this week and we studied them.

I think, Mr. Crawford, yours is somewhere around $7.85 if I remember correctly. That was in the grocery department only, not over-all, and yours, Mr. Dahl, is pretty close, right up against 9 percent. Ours is 5.6 percent because of the fact we use a tremendous amount of part-time labor. We are in a university town and we employ the boys and girls who go to school for part-time so our labor cost is probably a little less than the average.

Mrs. Kiefer: Dr. Stier, we are going to steal one more minute to let this gentleman ask his question. I am sorry we have already stolen some time.

(Member asks question relative to impulse buying.)

Mr. Crawford: We notice it more particularly with products that are advertised over television—I am not plugging them necessarily—but it is quite interesting to see how the children react to this. We have small carts in the store and they will grab these carts and go ahead of mother and in a few minutes they have gotten all these TV advertised items. So I would say that is impulse buying of a type, woudn't you?

Mr. Dahl: I believe I have very little to offer on that. But we are quite convinced that the average customer does not buy anything that is not on her list until she has her list completed. Therefore, we should make it as easy as we can so that she gets her list completed and then she can leisurely shop. That is why we have our non-foods department beyond the shopping part of our grocery department with the thought in mind that she is perfectly willing to take a little time to look around after she has her planned shopping more or less done.

Mr. Hooning: I think recent surveys have showed that impulse buying is increasing; that people come in with smaller lists of things they actually need and depend upon going down the aisle and seeing the merchandise as they go around. I think that is where the average sale comes in and that is why we say 'better labels, better display' etc. in order to make your items stand out on the shelf because she goes up and down the aisle and does a lot of impulse buying, I would say more than it was two or three years ago.

In other words, sir, impulse buying is increasing.

Mrs. Kiefer: Thank you, Mr. Crawford, Mr. Dahl and Mr. Hooning, and thank you very much, ladies and gentlemen.

The Future of the Packer's Label in Canned Foods Marketing

By A. J. Becker,
Foote, Cone and Belding

It is the easiest thing in the world for a convention speaker to cast himself in the role of a prophet of doom, for there is probably no more effective platform device than to point a warning finger at danger signs ahead for an industry.

That is not my intent this afternoon. Basically, the canning industry is in good shape. Retail sales of your products are running at about $4 billion a year. And there is reason to believe that you'll be able to make that figure higher in the years ahead.

The future of the packer's label, unfortunately, is not quite so bright. As a matter of fact, almost everyone in the food industry agrees that the packer's label today is caught in a gigantic squeeze that threatens its existence.

Let's begin with a definition. A packer's label, for the purpose of this discussion, refers both to the unadvertised and unpromoted second or third brands used by some national brand manufacturers to sell their second and third grades, and to all other unadvertised, unpromoted brands marketed by independent canners.

Some of you, of course, do some advertising and some promotion—spot radio or occasional newspaper advertising, for example. But generally your programs lack the continuity and depth of impact that would permit you honestly to describe your labels as advertised, promoted brands.

The unadvertised, unpromoted brands are in trouble and their future very much needs discussion. You are to be congratulated for having the courage to face up to this. It is becoming increasingly apparent that unless some course of action is decided upon—and decided upon quickly—there'll soon be no need to discuss the future because the packers' labels won't have any.

They'll be dead as a factor in food marketing.

There is, regrettably, no pat solution, no overnight cure. Nor can anyone, in honesty, say to you that the lot of the packer's label is going to improve substantially. The deck is stacked against that. But if you understand what has been happening in the food business—and particularly in the canned food business—you'll be able to see more clearly the several alternatives open to you.

Just as any consumer goods manufacturer, in making his plans for the future, must take into account what other manufacturers in his field have been doing, so the packer with his own label can better understand his problem if he first looks at his competition—the controlled, chain store labels and the national brands.

However you may feel personally and competitively about the national brands, most of you will agree that the success of the entire canning industry, the degree of acceptance you have achieved for canned foods, is due largely to the efforts of the national brands. Through their advertising, promotion and marketing programs they have sold the American consumer on the basic goodness and value of canned foods.

The first point of agreement to be reached, therefore, is that the future of all canned foods, including both the packer's label and the private label, depends on the continuing promotional activity of the national brands.

That promotional activity will continue, and it will expand. And while the programs of the national brands are not always as effective as they might be, it is still true that only the national brands, because of their size and resources, are in a position to do the over-all, national selling job required to keep the consuming public canned foods-conscious.

To this extent, then, the future of the packer's label and the chain label is inseparable from the future of the national brand. To understand what is happening to any one, you must first understand what has been happening to all three.

It's not necessary to look very far for some of the developments that have exerted a sledgehammer effect on the food business in the past 20 years.

Between 1930 and 1950 the population of the United States increased by 27,922,000 people. Since the last official census we have added 11 million more mouths to feed.

Per capita food consumption, traceable to an improved standard of living, has also increased substantially in many categories. Consumption of canned vegetables, soups, fish and baby food, to mention just a few canned foods, jumped from 21.9 pounds per person in 1934 to 41.6 pounds last year, a 90 percent increase.

Dollar sales of canned food at retail are still rising. But the percentage of the total food market enjoyed by canned foods seems to be leveling off. There's been a rapid growth in popularity of frozen foods, the so-called convenience foods, and improvements in technology and communications that make it possible for the consumer to enjoy fresh foods from faraway places all year round.

As a matter of fact, the amazing success of instant foods and convenience foods would seem to indicate that canners have not been capitalizing as fully as possible on one of their most effective talking points.

What, after all, is more instant or more convenient than canned food? Many of your products can be served directly from the can. With others it's simply a matter of heating the can's contents, but even with that extra step, most canned foods are ready for the table while the cook is still trying to decipher step two in the directions for preparing many so-called instant foods.

I'll venture a guess that the market for some of the products you now pack could be expanded considerably through proper emphasis on their convenience factor. And I'm confident that most of the large-line national brand processors have one or two "sleepers" in their lines that, with proper promotion and a correct advertising approach, could develop into solid marketing successes—success that would bring added volume, greater brand prestige for the entire line and additional profits.

You've been packing and selling convenience foods since the Civil War. But you've let the consumer forget it. You've been competing for a share of the existing market, instead of searching for ways and means of expanding your market.

Frozen foods are also becoming a bigger factor. Volume of frozen food production has more than doubled in the last five years—from 2 billion pounds in 1950 to an estimated 4.3 billion pounds in 1955.

The dollar sales increase of frozen foods last year alone was $225 million over 1954.

Or consider these government figures on fresh, canned and frozen vegetable consumption for the nation as a whole. Since the 1947-49 period, per capita consumption of fresh vegetables has dropped 5 percent; canned vegetables dropped 1 percent; but in those same years consumption per person of frozen vegetables increased 103 percent!

The same situation prevails among canned and frozen fruits and juices. Canned fruit consumption per capita in 1955 is 8 percent over the 1947-49 period; canned juices are down 18 percent; but frozen fruits, including juices, are up 141 percent.

If we trace these trends back as far as the 1935-39 period, the gains scored by frozen foods are even more dramatic.

In those 20 years per capita consumption of canned vegetables has increased 29 percent; but frozen vegetable consumption is up 1,375 percent!

Since 1935 per capita consumption of canned fruits and juices increased, respectively, 32 percent and 245 percent; but consumption of frozen fruits, including juices, jumped 862 percent.

Naturally, the appearance in the marketplace of these new types of food has increased competition for available display area in the food store.

Perhaps you have already seen a study just completed by the *Progressive Grocer* magazine in five Foodtown supermarkets. It makes interesting reading. Among a wealth of other data, this study shows how much display ground canned foods have lost.

It shows, for example, that more floor space is devoted in today's supermarket to individual displays of beverages, household supplies, crackers and cookies than to all canned vegetables combined.

More floor space is devoted in today's supermarket to individual displays of soap, bakery products, candy, gum and nuts than to all canned fruits combined.

More floor space—29 percent more—is devoted in today's supermarket to frozen foods than to all canned fruits and vegetables combined.

The Foodtown study shows slightly more than 3 percent of the supermarket's 3,672 available square feet of floor space is devoted to canned fruits and vegetables.

Twenty years ago, many of you will recall, it wasn't at all unusual to find a food store devoting upwards of 15 percent of its total floor space to these two canned commodities.

So in the jungle of today's supermarket competition all canned foods are in a battle for survival.

In looking back over the past 20 years the overriding, most powerful influence of all has been the phenomenal growth of the chain stores and voluntaries, the appearance on the food marketing scene of giant supermarkets that have completely revolutionized food distribution.

And with the development of the chain stores, a new factor appeared on the retail food horizon—the chain store's private, controlled label.

Historically, the national and wholesale grocers' brands dominated the canned food field and were the backbone of your growing industry. Through their advertising and promotional programs many national brands built for themselves personality and a true consumer franchise. Their high quality usually justified in the consumer's mind the higher price they demanded.

During this same time the packer's label enjoyed a small but healthy share of the total canned food market. The packer's label—then, as now—was sold chiefly on price. It received little or no promotional support and never developed a real consumer franchise. Probably the chief characteristic of the packer's label was its lack of continuity.

It was, in short, little more than a legal wrapper on a can.

The rapid growth of the chain stores and voluntaries changed the traditional national brand-packer's label division of the market. The chains set out to attract large numbers of customers on the basis of lower price. And though the national brands contributed heavily to chain store volume—even as they do today—the chains quickly realized that they could offer customers more attractive prices on non-national brand merchandise.

They had two possible sources of supply: the wholesale grocer's private label or the packer's label.

But the wholesale grocer's private label, as you know, had been created for just one purpose: to bring a higher mark-up to the wholesaler. It was unattractive pricewise.

The packer's label, while offering the right price, unfortunately varied in quality from pack to pack. And it didn't have the volume, under any one label, to insure the label continuity the chain stores' expanding operations required in order to build some degree of consumer acceptance.

So the chains were forced to turn to their own private labels. By contracting with a great number of packers at the best possible price, they were able to offer continuity, quality and price.

And they were able to make more profit—marginally more gross profit than on the national brands.

Only one other question remained to be answered: could the chain label compete successfully against the entrenched national brand?

The answer, you know today, was "yes."

It was "yes" because, as the chains found out by probing, many national and packers' brands had kidded themselves into believing they held a strong consumer franchise when, in fact, nothing could have been farther from the truth.

Unworried, many national and packers' brands sat back to let the controlled labels run their course. And under the umbrella of their complacency, the chain labels established a foothold and began building their own consumer franchise.

For a long time it was the attitude of many national brand manufacturers that the controlled label presented no long-range problem. It was fashionable to say that they were poor quality brands, unpromoted labels that the consumers would never fully accept.

The ridiculousness of that attitude is evident today.

Recently a colleague of mine had an opportunity to see a list of new specifications for canned tuna fish issued by one of the nation's leading chains for its own house brand. Those specifications were considerably more rigid than those for the leading national brands of canned tuna. And that's not an isolated instance.

So you can't dismiss private labels as poor quality brands.

In their preoccupation over the years with competition on the national level, national brand manufacturers lost sight of the fact that an increasing amount of their competition was coming from private labels. They were encouraged to some extent by food sales indices which traditionally lump private label sales under the catch-all "all other" category.

Only in the last few years has the national brand manufacturer realized that his most serious competition is coming not from other national brands but from the controlled labels.

We've suddenly realized that the private brand is anything but private. It's an advertised, highly promoted, highly merchandised quality product. And it's the national brand's awesome task to out-sell this label on its own ground.

That's why the packer's label is caught in a gigantic squeeze. The packer is fighting a highly promoted, advertised national brand on the one hand and a highly promoted, advertised private label on the other.

Even in his home town the packer cannot hope to out-advertise the national brand, and he certainly has no hope of out-merchandising the private label in the chain's own stores.

Some measure of the effectiveness of the job chains are doing in merchandising their own brands can be found in the reports of Pierre Martineau, director of the Chicago *Tribune* consumer research panel.

Here, for example, are two canned goods classifications that show what a large part of a chain store's volume in Chicago was represented by its own brands in one two-month period studied:

In canned corn, A&P's own brand accounted for 54.8 percent of their total canned corn sales. Jewel's brand accounted for 69.3 percent.

In canned fruit cocktail, A&P's own brand captured 45.2 percent of their total fruit cocktail sales. Jewel's brand, in their own stores, scored 49.8 percent.

In other words, in A&P and Jewel in Chicago, all the national brands and packers' labels combined get half or less of the stores' volume in these two categories.

Not all chain stores, of course, put the same emphasis on house brands. And even those chains that have been outstandingly successful with their own labels don't have their own brands in every category. But wherever chains do have their own lines—and wherever the national brand is weak—the chain label sooner or later absorbs a major share of the store's volume.

Nor can anyone underestimate the chain's importance as a distribution factor.

Mr. Martineau points out that in Chicago the five corporate chains have a combined total of slightly more than 900 stores, or about 8 percent of all food outlets. Their total sales account for about 45 percent of all consumer food purchases, including many lines where the independents are still strong, such as meat, bakery goods, dairy products, and produce.

However, in the packaged, branded items, where most processors operate, these 8 percent of all food stores in Chicago account for over 60 percent of the tonnage in most staple items and around 70 percent in the quality and specialty items.

If you combine the corporate chains and the better voluntaries, you have only about 25 percent of the stores in Chicago—but they do 75 to 90 percent of the volume in packaged, branded items.

The chain stores are well aware of their power, and significant changes have come about in their thinking about national brands. If, for one reason or another, they become disenchanted with a national brand, they are prepared to turn elsewhere for their profit—and that often means a house brand.

They can do that, however, only where there is a weakness in the marketing structure of the national brand. Where the national brand actually has no consumer franchise, then the chain store operator can honestly say: "I can get along without the national brand, but can the national brand get along without me?"

So it is important that the food canner—whether he be a small packer or a national brand manufacturer—understand that there is no such thing in the supermarket today as unswerving loyalty to one brand on the part of the operator.

As a producer of a packer's label you may feel that your brand has some degree of consumer acceptance, that you have sold for a number of years to a particular outlet, and that your market is safe. That may not be so. When it comes down to a question of dollars and cents per case—as sooner or later it will—the low-price packer is going to get the order.

The food store may carry your brand of peas and two or three others. But with shelf space at a premium and every square foot expected to show its profit every week, the brand that doesn't move soon disappears. It's not paying its share of the rent.

That applies not only to individual labels but may eventually apply to entire commodity classifications. Is there any reason why, for example, if frozen green beans succeed in winning a major share of the business, canned green beans shouldn't rate a smaller and smaller share of supermarket shelf space until they eventually disappear altogether?

There is at least one large chain whose present policy in many commodity fields is "our brand and one" or "our brand and two." The advertised brands are chosen on the basis of their standing in the market served by the particular warehouse, not on their national standing.

So in many instances in this chain, the number two, three or four brands are discontinued to permit greater merchandising facilities for the private brand. Where there is no private brand, they will carry two, three, or four advertised brands if that many have a fair sale in the market.

This present policy of "our brand and one or two national brands" could not have come about except [illegible] the fact that this operator found it possible to merchandise his own brands successfully against the national labels.

And nowhere in this chain's consideration, you'll note, is there any mention of the packer's label as an alternative.

At this point let's summarize the factors in food marketing that are working against the future prospects of the packer's label:

First, while canned food consumption per capita has risen since 1935, the percentage of the total food market enjoyed by canned foods is leveling off.

Second, tremendous sales gains have been scored by frozen foods and new convenience foods, and these groups may be expected to cut further into canned food sales.

Third, new types of foods are claiming more and more display space in the supermarket.

Fourth, the rapid growth of the chain stores and the need for fast-moving, profitable lines has put a premium on high-powered advertising, merchandising and sales promotion, none of which the packer's label has.

And fifth, the private, controlled label which is, in effect, an advertised and promoted label, has spurred the national brands to new advertising and merchandising effort.

The fact is that the packer's label —an unadvertised, unpromoted brand sold chiefly on price—faces almost insurmountable competition from the national brand and from the controlled label. And the competition is going to get even rougher as the national brands and private labels have it out in the food store.

Where, then, does this leave the packer's label?

In the first place, it doesn't necessarily mean that the packer's label faces extinction. There will always be a market for cut-rate merchandise just as there will always be a bargain basement in the department store. So while you may not be able to increase your label's volume substantially, you can always count on selling your pack at a price.

Much of your production is now in private labels. So your second alternative is to step up your activity in that area by installing more rigid quality controls, trying to keep down your prices, and cultivating the chain store business.

Or you can decide to compete more aggressively with both the national brands and private labels by building personality for your brand through advertising and merchandising. Your advertising will have to be credible, convincing, and must move the consumer to action. You'll have to develop imaginative, aggressive merchandising programs.

The difficulty here is that for most small packers a sustained advertising program is out of the question. Individually, you do not have the resources for a long-range, effective campaign. Nor can you, in the press of plant duty, pay much attention to the marketing of your labels. That you leave to the broker.

But if you want your cannery to be anything more than an anonymous private label supply house, you'll have to give some thought to marketing programs and to advertising on the local or regional level.

It can be done. Probably an outstanding example is the experience of a well-known company, whose marketing problem grew in proportion to its expanding production. The bulk of this company's pea pack was in fancy quality and went into its nationally advertised label. But each year they had to dispose of a lot of fine quality peas—not quite good enough for the top brand.

These were offered under their packer's label and to the private label buyers. Frequently, they were difficult to sell and the return was not good.

So these astute marketing people decided to do something about their growing problem. They developed a brilliant new label. And then they backed it with a coordinated advertising and merchandising program. They moved directly against the consumer and gained their distribution in all types of outlets. Maybe they didn't displace any brands, but today you can find that second label in independent, co-op and chain stores. This company thus carved out for itself a profitable market sufficient to absorb all of this pack that was once a problem.

What that company did, you can do, too. But you can't do it alone.

If the packer's label is to survive at all—and you wouldn't be here if you didn't think it worth saving—the day is fast coming when you'll be forced to band together—three or four, or many of you—in a cooperative effort, under a single label, with production quotas assigned to each of you.

It won't be easy. Cooperatives are never easy, particularly among a group of such rugged individualists as small canners traditionally have been. But it's one avenue to your salvation.

Just because you form a cooperative, of course, doesn't mean automatically that you'll be successful. Your massed production would mean nothing in this age of mass marketing. You'll need skilled marketing help—and that costs money.

You must set aside funds for local or regional advertising—and that costs money.

And you must set up merchandising programs in your sales area that will help you compete effectively against the controlled label and the national brand.

Most of all, you'll need sound financing to see you through the rough, formative years. Without the proper financing, you could soon find yourselves forced into the kind of distress selling that has troubled your individual businesses in the past.

But in your position, you should give serious thought to the formation of a cooperative. You should also think about putting a local advertising agency to work. If, at the beginning, the commission on your billings is insufficient to pay expenses, you'll find that most local agencies will work for you on some type of moderate fee basis.

In most cases it's well worth it, not only in the creative job an agency does for you, but in the production, the handling of scheduling, the insertion orders or contracts, the follow-through with media, and many other vital but specialized and time-consuming details.

If you do reach the cooperative stage, if you're seriously out to increase volume for your packers' labels, then by all means talk it over with some of your local advertising agency people.

You'll stand a lot better chance of converting your advertising into sales if you have objective and professional outside help than if you try to do the entire job yourselves.

This holds true even if you happen to be a born advertising man and your head is spinning with hot merchandising ideas. More often than not, the most effective advertising is the result of a close working relationship between a client and his advertising agency—with ideas stemming from both.

You'll also need trained marketing counsel—someone who has the time and ability to ride herd on advertising, packaging, market research, sales promotion, pricing, distribution, merchandising, and the dozens of other assignments that spell success or failure for a product.

There have in the past been several successful cooperatives among growers who were faced with a problem comparable to yours. Seldom, to my knowledge, has there been a successful marketing cooperative among canners. There may be good reasons. But at least you owe it to yourselves and the future of your individual businesses to explore the question further at one of your state canners' meetings.

Only last month this question of a cooperative for smaller packers was the main theme of the annual convention of the Tri-State Packers Association held in Philadelphia. There were indications by several speakers that such a cooperative effort would be looked upon favorably by both wholesalers and retailers.

It was also encouraging to note that there was agreement that the cooperation should embrace not just the marketing of a single label but also the processing and perhaps the growing of the crop. Such an arrangement would go a long way toward solving your most difficult problem—when you are forced to dump your inventory at distressed prices in an already overloaded market to meet your pressing obligations, thus inadvertently contributing to a further decline in selling prices.

The question of a cooperative requires a great deal more discussion, of course, but for the moment, your alternatives appear to be these:

You can continue as you have been —holding down the price on your brands, being content with a small profit, and hoping that your market doesn't shrink more.

You can increase your production facilities, pay more attention to uniform quality in your packs, and go whole hog into private label production—again taking your small profit.

Or you can learn from the experience of the national brands and private labels that success in the food field today depends on marketing programs that develop consumer franchises. You can band together in cooperatives and market local or regional brands of your own, supported by sound advertising and merchandising calculated to build personality for your brand with the consumer.

This latter course is the most difficult, admittedly. But in your position, it is the course that holds the most promise. It is the only means you have of putting your business on so firm a footing with the consumer that no national brand or private label can again threaten your market—or your profits.

Actually, the whole industry has a stake in your success. If, through sound financing and marketing, you can put an end to distress sales of merchandise, you'll help bring stability to the canned foods business. And stability, in turn, will enable the national brands to continue and probably expand their promotional activities which, in the long run, spell prosperity for every canner, large or small.

The Possibility of Establishing Your Own Label—from the Food Broker's Viewpoint

By Harry L. Proctor,
Paul Paver & Associates

We know that the problems facing the smaller and medium-sized canners are very urgent. We have no illusions that we are going to bring before you any suggestions that will satisfy the requirements of any great number of canners who may want their own brand promoted.

We have been aided by a very able group of representative canned food brokers throughout the country. They have contributed richly from their own experiences in this report.

Most of our thoughts have been given to the medium-sized canner who shows some possibilities of achieving, in a small way, some sense of security that has been achieved by the very large advertisers.

We have no "pat formula" for the solution of this problem. There are certain basic factors which must prevail to accomplish anything. First of these is loyalty. Loyalty to your broker and to the buyers who show that they are willing to be the vehicles of distribution for your products.

On this there is one little observation that we have made over the last few years. You will find it is the canner who has had a hit-and-miss sales program, that has gone around his brokers who is facing the greatest sales difficulties.

It is obvious that these canners cannot expect to have any sympathetic loyalty from either their salesmen or their buyers.

We have felt for years that there were two ways of merchandising canned foods:

First is to support an item or a group of items by heavy advertising and promotional expense. This is, of course, out of reach of the medium or small-size packer.

Second, by providing desirable merchandise properly labeled and packaged, priced at levels that would be assured of consumer acceptance. The willingness to undertake the responsibility of having merchandise available throughout the year.

We do know that large supermarket operators require availability of volume supplies. We are quite sure that if you can arrange your operations so that all of these factors have been complied with, many brokers could find a market in a substantial number of supermarket outlets for your products.

From here on the broker must take over. He must develop the idea in the buyer's mind of advertising these products. If possible, to induce large mass displays. It may be that your broker may have retail sales service to introduce your products through the cooperative and other retail units.

This idea presupposes that there will be imagination, persistence, flexibility and tact applied to the application of your marketing efforts.

Let us quote from the experience of some of our fellow members on the Canned Foods Committee of the National Food Brokers Association.

Broker A: "We shall try to set forth a few ideas relative to the sale of canned foods and to the relationship between canners and brokers, particularly the small and medium-size canners of non-advertised brands who primarily sell through brokers.

"We still stick with canned foods; and while we have some very nice accounts, most are the non-advertised firms with the possible exception of two packer's labels. While these firms do little local advertising (almost nil with us), they both have brands that are familiar to almost everyone. We feel confident that on the overall picture, our sales run at least 98 percent canned foods. So much for us!

"National vs. local brands: Many small and medium-sized canners have allowed the nationally advertised brands to steal away their particular markets. These national firms are merely former small canners who have grown large through promotions and through taking advantage of every opportunity that presented itself. In most cases, they have created these opportunities, thereby pyramiding their business and distribution.

"Almost every canner has a golden opportunity if he will but make the most of it. By laying plans for one market at a time (possibly two), and by promoting his products there through the combined efforts of his broker and distributors, he can have certain markets where he will be strong. We find many canners tend to spread themselves *too thin*, which we think is a mistake, since they should take on *only* what they can care for. It is far better to complete the picture piece-by-piece than to be in a continued oversold state, due to biting off more than they can chew. We have found some canners who are inclined to appoint new brokers when they are unable to supply their loyal brokers who have represented them for years on important goods needed for their particular markets. As we see it, the 'coasting days' are over for canners and brokers alike.

"There is another item of importance, one which we often have difficulty driving home to some canners, namely, covering the trade with the broker from time to time. Too many canners feel that if they mail price lists and samples, the Wizard of Sales (the broker) can wave his magic pencil and send in more business than they can fill! This is wishful thinking—thinking related to the horse-and-buggy days. Steady, constructive visits should take place between the canner and the broker, at which time the canner should cover the trade with the broker to understand various problems in each market. Also, the broker should visit the cannery during the canning season, if possible. A close-knit team can get results; and if you plow enough you will grow a crop—perhaps not the one you want or the yield you want—but you will produce."

You can see that this broker has been doing a lot of constructive thinking and has had satisfactory success.

Not all of these brokers have found optimistic possibilities in their markets. Each one develops his own facet in the thinking on this subject. Some of them are positive and successful in their ideas. Others find their efforts have shown little results.

We quote from Broker C: "From our observation we do not know of any constructive marketing that has been developed in our market. Sixty-five percent of the business in our market is controlled by three national chains and one local chain. All of them do considerable advertising on their own private labels, but frankly the nationally advertised lines still seem to hold their own. A couple of smaller

canners have tried to make inroads into the market by spending considerable money on TV and newspaper advertising, but we understand they have not been able to get very far. As a matter of fact we feel that as soon as they have to pull in their horns, they will find themselves back where they started from."

Here are some quotations from a broker in the Midwest:

Broker E: "For a small independent packer to expect substantial business in a market of this size is sort of futile as things stand now.

"The only solution now is for a packer to be a specialist in a small field and pack something better than branded competition. Distribution may be accomplished by using institutional sizes as a wedge. This can have quite a bearing from word-of-mouth advertising.

"The only way is to have a fairly complete line and to give an exclusive to some large local chain or voluntary, in return for promoting this line, although exclusives are only as good as the distributor wants them to be.

"Better yet would be consolidation of strong independent packers with one label, thus furnishing a fairly complete line of merchandise, cutting overhead cost per case, both of management and selling. They could make a better dog fight of it."

You will note that this broker feels that consolidation of strong independent packers under one label would settle the problem.

Broker F says: "It is not only our opinion, but many others that these canners must use a common brand.

"Group marketing under established labels, plus the selection of a good advertising agency for sound advertising, and by all means, the canners should establish a control over products by proper grading. All should cooperate and have a planned marketing program."

Broker D: "You and I have both seen this smaller canner's position deteriorate for many years. Having been a small canner myself at one time, I am deeply sympathetic and have tried to do things to be of assistance to them.

"One of the big difficulties with the small independent canner is that he usually does not have a complete line and when he tries to establish a label, even in local marketing areas, he runs into difficulty. Today most operators want a continuity if they are going to pay a price higher than the trading market.

"We are seeing what I believe will be a resurgence of private label merchandise. However, here again that is hardly a solution for the small canner as he must sell at the bottom of the market.

"The small canner, with a limited line, also runs into price difficulties when he tries to sell *two or three or four items under his label to supermarket operators or groups.* They feature nationally advertised or private label merchandise and buy the small packers' labels *only when it is a price proposition.*"

Here is a broker who is very optimistic:

Broker B, located on the Atlantic Coast where we have seen the last stronghold of the old-time wholesale grocer in large marketing areas:

"You have pointed out very well in a number of letters this past year, as well as the previous year, the necessity for helping the smaller canner stay in business. This is naturally of concern to all of us and we personally have been giving considerable thought to the matter, but, frankly, trying to come up with the correct answer is difficult.

"We feel that a canner should sit down with his broker, and find out just what customers he can depend upon. He should work out some kind of a promotional idea, and then really go to that particular customer or customers and work out what one should really call a partnership. In other words, the canner can let the customer know that if he is going to be the source of supply for, say, canned peas or corn or whatever the item may be, that he will *see that he is supplied the year 'round,* and give him some kind of a promotional allowance to help him compete with the national brands.

"Furthermore, work up a type of a contract so that if the customer has overestimated his requirements, the balances can be reviewed throughout the year, reduced accordingly and thus place the canner in the position to sell the cancellation quantity elsewhere before it is too close to new pack. By the same token, *if the buyer gives the canner the assurance* that he is going to do everything possible to go out and promote the particular item he is buying from them, then the canner could feel more at ease. In addition, we know that in many instances the buyers are willing to work with the canner as far as price is concerned on the *basis of the market at time of shipment* and not have the canner tied up on, say, a low cost basis which was established in the early part of the season in order to meet some cheap competition. After all, the independent buyer realizes that the canner must make money or he is not going to have a source of supply in order to compete with the national brands."

We believe this report is quite comprehensive and shows that a good many of our members have seen possibilities in packers' brand marketing. These are suggestions that are worth studying. That faith is the basis of this project.

Let us recapitulate the ideas that have been developed.

First, the canner must convince himself that he has possibilities among his distributors to sell his products under his own brand.

Secondly, the canner must be sold on the requirements and the possibilities of his project. He must approach it with "sympathetic understanding." The Spanish call it "simpatico."

Third, if he is to sell the maximum number of his mass marketing distributors, he must develop with his broker a practical and profitable merchandising proposition on his brands. He must make them available every day in the year. The merchandise must be desirable quality. Prices must have recognized salability, packages should be properly labeled so that they can at least have as much "arresting attention" as the competitive advertised brands.

We quote from Broker G:

"It is our experience that packers with a cooperative advertising program who are also willing to invest nominal amounts for retail promotional work are making progress and getting their brands well established. In today's mass marketing it seems like both an advertising contract and nominal expenditures for retail promotional work are absolutely necessary."

If you go home and study your own business, there are undoubtedly many among you who could bring up a program which your brokers can grasp practically and develop business.

It may be possible that the easiest way to approach this would be to attempt to switch much of your buyer's label business over to your own. This could be done largely by showing your buyers that quicker service could be secured, with a faster turnover and less delay in shipments.

These ideas are not mere suppositions, because back of this are many other very substantial operations that have been developed over the past several years. Our manufacturers not only have switched their business to their own brands but have increased their volume very substantially.

We have in mind one packer whose business is well over a half million dollars in one market and can do all of his billing in one afternoon, because the business is switched over from a myriad of small orders in pool cars to straight carloads of one item under packer's brand. Normally carlots can be shipped with the minimum amount of labor and time in the warehouse, and incidentally at a much lower cost.

If we have given you any thoughts of any value in this report, we are very happy to have done so. From here on, it is going to take your own imagination and that of your brokers to develop the ideas.

Now let's look into the future. I feel that the canning industry as a whole will have its very best years ahead of them. This may not apply

to all individual canners. We are going to have a tremendous increase in population in the next 20 years. The canning industry is going to feed this great increase. Frankly, I think that some small commodity canners will always be in difficulty.

Those canners that have brands and merchandising relations built up with mass marketing outlets will certainly have a considerable advantage.

We would like to mention a *method* that we want to stress. That is the importance of mass displays in modern supermarkets. Recently, one authority made the statement that 48 percent of store purchases were made by impulse. If you have your merchandise in large displays at isle ends where the consumers are forced to almost stumble over them, you have a better chance of making a sale than the finest advertised brands that only have shelf position.

We have been very pleased with the voluminous correspondence with our Canned Foods Committee. There are many evidences that the brokerage fraternity is well abreast of the responsibilities that these problems present.

We suggest that when you go home, you analyze your own packing possibilities. Then consult your brokers in the market where you feel that you have the best opportunity of expanding your operations under your own brands. Then possibly some of you will report next year that you have made some real progress.

Convention Proceedings

(Continued from page 10)

adequate labeling to supply her with the information she is entitled to have. This is a record of which both you and we can well be proud. It constitutes an encouraging and inspiring illustration of democracy at work, showing as it does how a great and diversified industry has been willing and able to work through the years with a regulatory agency, always with the purpose in mind of improving its products and the service that it offers the consuming public. We are confident that future years will see a continuation of close cooperation between the canning industry, its Association, and the Food and Drug Administration. Fifty years have proven that you in the production of food and we in the administration of the Act jointly seek to give real meaning to the purpose of the statute, "to promote honesty and fair dealing in the interest of consumers."

The stage had been suitably decorated for the anniversary program with the large, colored Golden Anniversary Seal of the FDA mounted and illuminated above the speakers table. Another part of the observance was a big display in the lobby of The Traymore of the scientific instruments used in the modern, painstaking preparation of commercial canned foods. The exhibit emphasized the contrast between the very few, crude instruments in use prior to passage of the Food Law in 1906 and the many examples of scientific apparatus now common to canning. Many of those shown were developed especially to carry out the standards of quality developed under the Food Act, with government and industry cooperation.

Where Is the Farm Problem?

In the keynote speech of the Saturday afternoon Closing General Session, Secretary Benson credited the canning industry and other food processors with the fact that American children are bigger, stronger, and longer-lived than their grandparents. He said that the better nutrition that has brought this about was achieved "through the joint counsel and joint efforts of millions of Americans—farmers, food processors, warehousers, wholesalers, retailers, and manufacturers of equipment—as well as research and medical people, home economics workers, and a host of others. The progress in nutrition that we have made is the joint product of millions of Americans working together—under our system of free enterprise."

The Secretary also said that at least 90 percent of grocery products are sold self-service, and that "without the canning industry, this degree of self-service would be out of the question." Canners have created a higher standard of living for our people, Mr. Benson asserted.

Today's farm problem, he said, is largely a result of surpluses. "In future years we must avoid, as we would a plague, farm programs that would encourage a build up of price-smothering surpluses. There is no sounder investment of tax dollars, in the future of the United States—in the health, prosperity, and welfare of our people—than an investment in agricultural research, particularly in the fields of new uses, new markets, new crops, improvements in our marketing mechanism, and an expansion of basic scientific knowledge.

"Research can solve directly the various problems of growers, processors and shippers." The Secretary mentioned several examples by which the canning industry, through its research, has brought about much more effective and profitable handling of crops.

The fact that the canning industry does not create surpluses, or in other ways contribute to the current national farm problem, was brought out in two other speeches on the program, which was entitled "Where is the Farm Problem?".

Howard T. Cumming, of Curtice Brothers Co., a Past President of N.C.A., said:

"The critics of the Administration are pointing out with great emphasis that the farmer is receiving a declining share of the consumer's food dollar. They are accentuating and parading before us every misfortune of the farmer during this period of recovery from the ill effects of a past policy which has created unmanageable surpluses and depressed markets. They would have us believe that the farmer's economic future is threatened and that this may lead us into a nationwide depression. The Administration is being charged with failure to solve these problems.

"Admittedly, there are serious problems to be faced, but certainly there has been no sign of a failure to meet them squarely. Moreover, the picture is being distorted. It is true that total farm income is declining, but it must also be remembered that the total farm population has declined 29 percent since 1939. Furthermore, only about two-thirds of the farms included in the usually quoted total of 5 million are actually commercial farms. Even to qualify as a commercial farm the income can be as low as $250 a year. In addition, the farm operator cannot work off the farm more than 100 days or receive more than half of his income from non-farm sources. Nine hundred thousand or almost one-fifth of all farms were classified in the 1954 census as 'residential' with a value of farm products sold of less than $250. Another 600,000 were part-time farms where the farm operator worked off the farm more than 100 days in the year and where, in most cases, the non-farm income was greater than the value of the farm products sold. Figures on farm income can be deceptive when you realize that only two million farms are responsible for the production of approximately 85 percent of the total food and fiber marketed."

Mr. Cumming stated that vegetable canners many years ago "recognized the need for extending availability and for spreading the risk of growing and marketing.

"The canner, through the preservation and storage of vegetables in millions of cans, greatly expanded their market. He made them available everywhere and at all times. He gave to vegetables characteristics of non-perishability and quality which explain their extraordinary development as a food product.

"But, perhaps even more important, the canner devised and developed a method of buying these crops which substantially relieved the grower of the economic penalties of overproduction. This is the grower-canner contract—which describes the conditions under which the crop is to be grown and sets the price of the commodity. This contract is negotiated between the canner and his growers in advance of the growing season. The grower first has the choice of determining

whether he will grow the crop at all. If he does so decide, the terms are agreed upon at a time when both parties are in a position to survey the canned foods market and to exercise judgment as to the size and value of the crop to be grown. If a substantial carry-over into the new season is then threatened, there is a natural and proper tendency to lower prices and reduce packs. If a shortage is threatened, the opposite takes place—with increased prices and expanded production.

This mechanism may truthfully be said to provide not only a support price for the crop but a price adjusted to the needs of the particular season. Its flexibility is not tied to outdated formulas but rather to the economic forces of supply and demand, which in the long run will be controlling under any conditions. Such surpluses of vegetables for processing as may develop are not stored in government warehouses to be ultimately peddled at a sacrifice, but are placed in the hands of processors who, of necessity, must and do dispose of them, thereby opening the channels for further production."

William U. Hudson, who had been elected President of N.C.A. at the first session, spoke next, on the canner-grower situation as reflected in fruit canning.

"I am grateful that the canning industry and its growers are not a part of this so-called farm problem," he said. "We do not have millions of cases of canned fruits resting in government warehouses. By and large, prices to consumers are at a competitive level, and the average return to fruit growers has been increasing—not declining. It can be emphatically stated that fruit crops for canning cannot be classed among those crops contributing to the national farm problem; and I cannot see why we should be confronted with any such situation in the forseeable future.

"The record shows that, for the past four years, growers of fruits for canning have actually received each year successively higher income for the fruits that they marketed through the canning industry. Cash receipts to growers of canning fruits in 1955 were up more than one-third above the 1952 figure—from $103 million to $143 million. In contrast, cash receipts from all farm marketings declined close to 11 percent during the same period. These facts certainly indicate that federal controls are in no way needed in the production and marketing of fruit crops for canning.

"Neither the government nor the grower has to cope with accumulated surpluses of fruits for canning, which present a perpetual disposal problem overhanging the market, depressing farm prices and farm income.

"I do not mean to infer that we do not, at times, have maladjustments between supply and demand, with the normal resultant economic corrections that follow; but the forces that bring about the corrections begin to function promptly and are not postponed. Extra marketing effort is exerted; and, at times, inventories are liquidated by canners at substantial loses. But, in any event, the problem is on its way toward solution. Elaborate and expensive controls and administrative machinery are not necessary.

"The record of facts and figures that has been presented here is, I believe, an outstanding example of the merits of the present marketing system which stimulates market development and earnest merchandising of fruits by the canner.

"In contrast to the general situation, the farm income from these fruits for canning has been rising, canned fruit prices are competitive, and there are no surpluses in government hands.

"It is clear that there is a sound foundation for the deep-seated conviction of canners that federal legislation and the attendant controls are not necessary to insure a fair and reasonable return to producers of fruits for canning."

Following the speeches on the Farm Problem, remaining items of Association business were transacted. Fred C. Heinz, chairman of the Resolutions Committee, brought in the Convention resolutions (see page 34) and these were unanimously voted. The 1956 officers were installed, the Finance Committee appointed, and the last item of business was the award to Past President Morrill. E. E. Willkie was spokesman for the Association in presenting a navigator's compass to Mr. Morrill, whose chief hobby is cruising his boat along the Maine coastline.

Convention Issue

This issue of the INFORMATION LETTER is devoted to the proceedings of the 49th Annual Convention of the National Canners Association, in Atlantic City, N. J., January 17-21, 1956.

This 116-page issue compares with the previous record-size 112-page issue published in 1955 and with the 100-page issue published in 1954. It is in the mail within two weeks after the close of the Convention.

N.C.A. Convention Exhibits

The N.C.A. had two exhibits at the Convention. One featured instruments developed during the 50 years of Food and Drug Law on standards for canned foods. Standing at the exhibit are Howard R. Smith (left) of the N.C.A. Laboratory and Nelson H. Budd, Director of the Information Division of N.C.A.

Another N.C.A. exhibit occupied Booth 9 in The Canners Show. It was given over to displays illustrating nuclear tests of canned foods in Nevada last spring. A large display board mounted with enlarged group photos of the canned foods samples showing their appearance before and after the blast and samples of actual cans, jars, and shipping cases that went through the explosion test were displayed.

The center section of the booth consisted of a miniature theater with capacity for 40, and every hour on the half hour the 48 color slide presentation of the before and after scenes of the test was run with automatic sound track developed by the N.C.A. Laboratory and Information Division and an automatic projector loaned by the U. S. Army Exhibit Unit. At the far right of the booth was a display of "Grandma's Pantry," Federal Civil Defense Administration's recommendation of a 7-day emergency canned food supply with part of the display constructed live showing the actual cans and jars of the recommended foods. FCDA also supplied handout literature illustrating Grandma's Pantry and other aspects of atomic bomb situation.

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